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SYMPOSIUM—OTITIS MEDIA SUPPURATIVA.*

ETIOLOGY, PATHOLOGY AND SYMPTOMATOLOGY OF ACUTE SUPPURATIVE OTITIS MEDIA.

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ETIOLOGY.

Age.—The greatest number of suppurative ear diseases occur in the first three years of life.¹ The predisposition of children to otic infection is due to hyperplasia of the lymphoid structures in the pharynx and post nasal space and to the frequency with which the acute exanthemata occur at this period.

Sex.—In the first 12 years of life it would seem that more females than males were affected (45 per cent to 32 per cent).² Later on this relationship is reversed—6 to 4.

Season.—Winter and spring furnish more cases than summer and autumn. It is interesting to note that the months in which the otic infections are most frequent are the same as those in which pneumonia and epidemic cerebro-spinal meningitis are most prevalent.³

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Climate.—The percentage of acute suppurative otitis is the same in America and Europe (Knapp). It is probable, however, that these cases are more frequently seen in parts that are subject to sudden variations in temperature and where the percentage of humidity is greatest.¹⁰ That the action of cold on the cellular elements of the ear is a potent predisposing factor in acute ear diseases there can be no doubt; both clinical experience and experimental observations attest this. The experiments of Pasteur on chickens, and those of Lipari⁸ with pneumonia sputum conclusively prove this. As an ætiological factor in the genesis of ear affection cold is given by Kramer in 16.7 per cent; by Schwartz, 18.5 per cent; by Harrison, 31 per cent; by Wilde as 31 per cent, and Bürkner as 13.9 per cent of cases. It does not matter a great deal whether the cold is moist or dry, the effect is about the same. As example of the deleterious effect of dry cold air may be mentioned those cases of acute otitis which have occurred in persons who have been overheated and, bathed in perspiration from dancing or other exercises in close rooms, have suddenly gone out doors to "cool off." The effect of cold water (moist cold) is exemplified in the otitis originating from bathing in fresh or salt water. Though the opinion of the injurious effects of sea bathing as a cause of acute middle ear disease, or as to its deleterious effect in chronic otitis has been opposed by a number of otologists, among them Guye,⁹ the concensus of opinion is in this regard affirmative. Cold feet is also frequently associated with chronic catarrhal inflammations, and Brandau has found the coincidence of hyperhidrosis pedum with catarrhal affections, which later condition was greatly ameliorated by the use of Liquor Anti-hidorrhoricus.

Whatever may be the predisposing cause, or whatever the inflammatory type, pathogenic micro-organisms play the most important ætiologic role. The germs most frequently present in the exudate are the diplococcus pneumoniae and the streptococcus pyogenes less frequently occur the staphylococcus pyogenes albus and aureus, the pneumo bacillus, bacillus of Friedländer, the bacillus pyoscyaneus, staphylococcus cerus albus and aureus and the micrococcus tetragenes. Pes and Gradenigo have found the bacillus pyoscyaneus as an unmixed infection in a case of acute otitis. The studies of these authors as well as those of Gessard and Chasrin with this micro-organism tend to prove that it is capable of producing local as well as general infections. However, micro-organisms are rarely found in pure culture in the aural exudates. Kathrack out of thirty-one cases of acute otitis media examined before perforation occurred,

found pure culture of *diplococcus pneumoniae* only three times. The *staphylococcus pyogenes* is most frequently found as the mixed infection. Other pathogenic germs that have been found in the exudate of acute otitis media are the *bacillus typhosus*, *bacillus saprogenes*, *bacillus pyogenes*, *diplococcus intercellularis meningitidis*, *bacillus* and *staphylococcus tenuis*, *bacillus diphtheriae*, the *bacillus influenzae* and the *gonococcus*. That the *smegma bacillus* has been found⁷ by Phillips⁸ in otitic discharges should be born in mind on account of its close similarity to the *bacillus tuberculosis*, both in morphology and in staining reaction. There is a growing acquiescence in the opinion first expressed by McKernon, I believe, that of all these micro-organisms the germ most to be feared as possessed of greatest virulence, and productive of greatest destruction is the *streptococcus pyogenes*. Equally destructive is the *diplococcus intercellularis*, and it may be stated as an axiom that whenever either or both of these organisms are found our prognosis should be more guarded and resort to operative procedures be had earlier than with any other of the pyogenic organisms mentioned.

Route of Infection.—The tympanic cavity may be infected by way of (1) An intact drum head, as in erysipelas, tuberculosis, eczema, etc. (2) Through a perforation of the tympanic membrane. (3) By way of the circulation (*a*) in the congenital otitis media accompanying infectious diseases in utero—variola, typhus recurrens, diphtheria, etc.; (*b*) in the same diseases occurring in extra uterine life; (*c*) in endocarditis (Trautmann). (4) By way of the tuba Eustachii; (*a*) indirectly, by way of the lymphatic interspaces; (*b*) directly by continuity of surface (and this is the most common way); (*c*) through the lumen of the tube, as in forcing infection-laden mucus into the ear in coughing, vomiting, douching, blowing the nose, etc. It is probable that the middle ear may be invaded by way of the *fissura petrosquamosa*, as Gradenigo in a case of cerebrospinal meningitis found the same organisms in the tympanum about the *canalis Fallopii* as were present in the meninges.

Apart from the peculiar pathogenic character of the various micro-organisms, there are other factors which determine the type of an otitis. In other words the same micro-organism may under different conditions give various types of inflammation. This is probably dependent on the intensity of the bacterial virulence, the number of organisms, the resistance of the tissues and the rapidity of invasion. On this data Moos has divided the resulting inflammation into these categories:

1. Those cases in which a relatively small number of organisms gain entrance to the tympanum through the lumen of the tube and produce in the cavum, by mucoid metamorphosis of the cell protoplasm the secretory form of middle ear catarrh, which, without treatment may exist for months or years without suppuration occurring. Suppuration supervenes only when the organisms increase in number on account of a change occurring in the nutrient media of the mucous membrane from taking cold, injury, or when additional micro-organisms are forced into the middle ear.

2. Those cases of hæmatogenous invasion, which cause infiltration of numberless polymorphous wandering cells in the mucous membrane, as for example, in measles, scarlet fever, diphtheria, etc. Each focus is inclosed in a fibrinous network causing the mucosa to become hyperplastic. In this form there is no tendency to suppuration. Instead, the microbial products of metabolism may be exerted to produce change in bone, necrosis of blood vessels, etc., but metamorphosis occurs in the end without the formation of pus. The most probable explanation of this is there are a relatively small number of microbes of attenuated virulence.

3. Cases in which suppuration occurs, the same being divided into: (a) those in which suppuration is slight without perforation; (b) those in which suppuration is more or less profuse with perforation; (c) those in which the onset is rapid, the suppuration great with destruction of large area of the membranæ tympanum and exfoliation of one or more of the ossicles.

In order to properly comprehend the exact change occurring in the cause of an inflammation of the otic structure, we must remember that the mucosa of the ear and mastoid cells is peculiar in this: that it serves the double function of mucous membrane and periosteum, that the osseous structures which it covers derive their nourishment from it. This fact explains the proneness with which otic inflammations result in necrosis. The glandular element is scant, except in the neighborhood of the tympanic end of the Eustachian tube. The mucous of the middle ear is largely secreted by its surface epithelium.

Now, experience proves that the purely catarrhal and the suppurative form of otitis media may be caused by the same micro-organisms. The determining factor is therefore, not the micro-organism, but is, in my opinion, the mode of invasion. That is to say, when the invasion is hæmatogenous or by way of the lymph spaces of the Eustachian tube we are most liable to have a suppurative process. When the invasion is from the surface we have the

catarrhal variety. That a purely catarrhal inflammation may become purulent is proven by daily experience and when this does occur we may know that the superficial protecting epithelium has been somewhere destroyed, and the organisms have gained access to the substrata of the mucosa.

As far as I have been able to determine there have been no reports of histological studies of the primary changes as they occur in the human ear in the cause of an acute otitis media. We have to depend for our knowledge of these primary changes on experiments on lower animals, on the cases of hæmatogenous otitis⁹ and on allied processes which occur in structures such as the eye, etc. From these we know that the effect of bacteria are not confined to the exact spot on which they may have found lodgment, but are to be discerned over a much greater area. These distant changes are ascribed to the natural products of microbial metabolism set free in the tissues (Phlogosin). The effects of this chemical body produce a reaction characterized by hyperæmia, exudation, the diapedesis of round cells (purulation) and the formation of new blood-vessels. With the decline of the vegetating stage of the bacteria which produced the primary infection the life history of the putrefactive organisms begin, and it is at this point that the line which divides the acute from the chronic middle ear suppuration may most usually be placed. If the hyperæmic stage progresses we find various changes according to the intensity of the inflammation. The mucosa becomes more deeply red or mottled from punctate hæmorrhagic areas; it becomes more and more swollen. The cavum is filled with a muco-purulent or purulent or fibrino-hæmorrhagic exudate. Microscopic examination shows that the epithelium is still in place or exfoliated over greater or less areas. The substrata is filled with round cells, the blood vessels are distended, while small hæmorrhagic foci are scattered throughout the mucosa. If the inflammation is intense we may observe true areas of necrosis scattered throughout the membrane. These necrotic points correspond to those at which the greatest number of micro-organisms are found.¹¹ The tympanic membrane is perforated at an early date in the exudative stage, and more or less of it may have been destroyed by necrosis.

What has been said of the tympanic cavity may be applied to the mastoid antrum and cells. The empirical division of the ear into its various parts for anatomical descriptive purposes is, I think, indirectly responsible for a misconception of facts when the middle ear becomes the seat of a suppurative process. In this regard this concept must always be borne in mind that the middle ear begins with

the pharyngeal end of the Eustachian tube and ends with the last and most remote pneumatic cell in the temporal bone, that not infrequently such cells are of as much or greater magnitude as the cavum tympani,—that these cells form a system of cavities of which the so-called middle ear is only a part. It follows as a natural sequence that whenever the cavum becomes inflamed the antrum and cells in conjunction therewith participate *invariably* in the inflammation. The question naturally arises “why do so many cases of acute middle ear disease recover without mastoid involvement?” The question is answered by saying that the involvement of the bony wall of the cells depends: 1st. On the position of the cells as regard the possibility of their contents being drained through the middle ear. 2nd. The virulence of the invading micro-organism. 3rd. The resistance of the tissues.

As this division of the subject will be treated further on in this symposium, I shall proceed to

Symptomatology.—Acute suppurative otitis media is ushered in with pain, fever and general malaise. The symptom most prominent is pain. It is described as stabbing, boring, throbbing and is more exquisite in children than in adults. Usually located in the ear, it may be accompanied by trigeminal or cervico-occipital neuralgia. (Politzer.)¹² The pain is subject to remissions, but is usually worse at night. The pain is made worse by sneezing, coughing, swallowing and bodily movement. Rarely the pain in the ear is accompanied by photophobia, and even congestion of the conjunctiva and cedema of the eyelids on the corresponding side.

Only in rare instances is the disease ushered in with chill, vomiting and vertigo. Accompanying pain, the temperature is elevated from one to four degrees (Fahrenheit). The height of the fever has more prognostic significance in adult life than in childhood. In children and in nervous or hysterical adults, the initial fever may be accompanied by delirium, convulsions and arrhythmia. Continuance of over one degree of fever a week after perforation of the tympanic membrane indicates purulent involvement of the mastoid cells or other complication. Entotic sounds are rarely the subject of complaint, but are usually present and are caused by increase in the labyrinthine pressure, or hyperæmia and serous exudate in the labyrinth or, as Moos has demonstrated in the case of typhus, by small-cell infiltration in the region of the acusticus. Audition is more or less decreased, especially before perforation of the tympanic membrane. F. Warner¹³ has investigated the reactions of 16 cases of acute otitis media with the Bezold-Edelmann continuous tone

series and his results in all essential particulars correspond to those which I have obtained at the Illinois Eye and Ear Infirmary during the last three years.

1. The lower tone limit is not markedly raised in maximo to D_{-1} (=36dr).

2. The upper tone limit is markedly lowered.

3. The Weber test, is positive for the diseased ear; when both ears are involved it is positive for the one most affected.

4. Rinne test is negative.

5. After recovery a positive Schwabach and slight defects of the upper tone limit remains as well, and shortening of duration for certain tones even after hearing for voice is normal.

The otoscopic picture is characteristic. The tympanic membrane is hyperæmic or mottled and bulging. At the beginning of the attack the hyperæmia may be confined to the membrana flaccida and that part covering the long process of the malleus. Ecchymoses or serum blebs may occupy limited area of the drum head or of the external auditory canal inside of the isthmus. The bulging of the tympanic membrane indicates myringitic abscess or collection of fluids within the cavum or both. In all cases of severe otitis the hyperæmia extends to the tissues of the external auditory canal in the neighborhood of the tympanic membrane. Bulging of the superior posterior quadrant with lowering of the posterior superior wall of the external auditory canal is an almost pathognomonic sign of involvement of the mastoid cells and antrum. Such a condition often assumes a "nipple shape" at the apex of which the perforation occurs through which the discharge takes place always with more or less difficulty. The determination of the site of the perforation is important for proper treatment.¹⁴ Perforations frequently occur in the upper and lower posterior quadrants or in the lower anterior quadrant. A marginal perforation or multiple perforation and a rapidly increasing perforation in the lower anterior quadrant indicates constitutional trouble, usually tubercular in character.¹⁵

THE TREATMENT OF OTITIS MEDIA SUPPURATIVA ACUTA.

BY S. MACCUEEN SMITH, M.D., PHILADELPHIA.

The early recognition and prompt treatment of acute inflammatory diseases of the organ of hearing is one of the most important duties devolving on every practitioner of medicine. It is a sad reflection on our boasted civilization to realize that it will take some years yet to impress upon the medical profession the great importance of this simple fact, and overcome the professional skepticism that became prevalent many years ago, and to some extent still exists.

The ignorance of the laity in the most fundamental rules governing the care of their own ears, and especially those of their children, is not surprising when we recall the empiricism that has surrounded the organ of hearing and its treatment throughout the history of medicine. It comes within the province, I may say within the power, of this and similar societies to effectually end the prevailing gross ignorance of the most simple methods for taking care of the ear.

Many of our members direct the teaching of otology in the various medical institutions of this country, and can therefore exert an effective influence at the foundation, the very beginning of medicine, by properly instructing the medical student. I, for one, regard it as a disgrace and an injustice both to the embryo practitioner and to the public, to confer the honored degree of Doctor of Medicine upon any candidate who is not able to diagnose and properly treat acute diseases of the tympanic cavity. If such knowledge were more general, and greater pains were taken to instruct the public in their duty, the specialist would be called upon to treat only a small part of the multitude of suffering humanity that now crowds the clinics of every city in the world.

It will not be denied that the prompt and proper care of an acute catarrhal otitis media, will in a great majority of cases prevent it from progressing to the stage of suppuration; furthermore, should the case have already reached the stage of suppuration, this same prompt recognition and care will in most instances arrest the progress of the disease, and insure a prompt recovery without loss of function or other disability. Then again, should the disease be purulent from its inception, immediate evacuation of the pus will effectually prevent many serious complications and consequent loss of life.

To clearly define the exact termination of an acute otitis media without suppuration, and the beginning of an acute suppurative inflammation of the tympanic cavity, is purely a supposition based on theoretical, and not on practical knowledge; neither is the ending of an acute suppuration distinguishable from the beginning of a chronic discharge.

Some cases are doubtless purulent from the very inception of the disease, and may therefore be properly termed acute suppurative. On the other hand it will not be denied that a great majority of all suppurative diseases of the tympanum are primarily catarrhal, but later become suppurative from sheer neglect, either on the part of the patient or of the attending physician. So long as the acute inflammation is confined to the stage of hyperemia and consequent hypersecretion of the mucosa, it can be classed as the non-suppurative variety. If, however, the accumulating secretion remains for a time confined within the tympanic cavity, further pathologic changes rapidly develop, over-distension and perforation of the membrana tympani occurs, and the case is then known as acute suppurative.

It is impossible, therefore, to distinguish between acute *catarrhal*, and acute *purulent* otitis media, until the stage of perforation becomes manifest; hence the treatment to be applied during the hyperemic or acute stage is identical in each.

In the interest of effective treatment, however, it is important to distinguish, as far as possible, between an acute otitis media caused by an attack of coryza, or other mild forms of the disease, and that of the more virulent type occurring as a complication or sequela of one of the exanthemata, or from epidemic influenza or pneumonia. The former variety usually yields to the application of the most simple remedial agents if these are employed during the stage of congestion; while the latter are generally purulent in character and demand prompt and heroic measures for their relief.

In the opinion of the writer, the aural diseases complicating epidemic influenza and pneumonia, on account of their virulency and persistent tendency to cause necrotic changes, are probably more prone to produce intra-cranial lesions than an aural involvement complicating one of the exanthemata. The ravages of the bacillus of influenza and of the pneumococcus, after the acute symptoms have somewhat subsided, are so insidious that mastoid or intra-cranial involvement is in many cases actually well advanced before the complication is discovered, and this occurs notwithstanding the physical symptoms apparently denote marked improvement in the general condition.

In these cases a relapse frequently takes place, and without presenting any aural symptoms whatever, death occurs during a violent convulsion; or, as was manifest in two cases seen by the writer this past winter, death was preceded by a condition in which Cheyne-Stokes respiration was most marked.

Recent bacteriologic investigations demonstrate beyond question that the quantity, and especially the quality, of the discharge are all-important factors in considering the treatment and prognosis of individual cases. Generally speaking, a discharge without fetor has been considered harmless, and, therefore, in most cases has received but little attention except for cosmetic purposes. It is a mistake to assume that the virulence of an aural discharge can be judged by its odor, or that the gravity of an otorrhea can be measured by its chronicity. An odorless discharge from the ear sometimes contains pathogenic micrococci which may cause some of the most serious intra-cranial inflammatory lesions. The same observation is true in many cases of fetid otorrhœa. Nevertheless, non-pathogenic cases are often seen, even where the fetor is extreme, clearly illustrating the value of the microscope and cultures in the differential diagnosis of cases of suppurative diseases of the tympanum. Such a demonstration of the presence of the bacillus of influenza or other infectious micro-organisms is a practice to be commended, and should be employed when at all practicable. Within a very short time, however, the discharge from the tympanic cavity is liable to develop a mixed infection, such as the streptococcus, pneumococcus, staphylococcus, etc., thus often supplanting the original germs present. To be of service, therefore, the examination must be made as soon as the pus has been evacuated, whether from a spontaneous rupture, or after an incision of the membrana tympani.

The character of the general illness, of which the aural complication is but a local manifestation, will frequently aid us in determining the necessity for early surgical interference. If, therefore, the organ of hearing becomes involved during an attack of one of the exanthemata, epidemic influenza or pneumonia, the ear should frequently be examined and treated energetically. This is all the more important in the case of children, and especially in infants, so many of whom have died from meningitis or other complications, while the underlying cause of their illness had been entirely overlooked.

Primarily then, the most effectual method of treating an acute suppurative otitis media, is by the adoption of preventive measures to arrest the disease at the stage of hyperemia, thereby preventing it from progressing to the point of suppuration. If, however, this is not accomplished, and the stage of suppuration has arrived, it is

most unfortunate, if from tardiness, or through ignorance or neglect, the membrana tympani is *allowed* to rupture spontaneously. It is equally to be regretted if the patient has been subjected to the ineffectual operation known as paracentesis of the membrana tympani; a procedure, to the mind of the writer, that has no useful place in aural surgery.

The old surgical axiom, "Wherever there is pus leave it out," is to-day quite as pregnant with truth as it was when first promulgated by the elder Gross. When the middle ear, as well as other cavities, is filled with pus, it must be thoroughly evacuated; this, however, can never be accomplished by a simple puncture of the membrana tympani. The membrane, consequently, must be *freely incised*, the chief requisite being to carry the incision from the most bulging point downward to the lower border of the canal, said incision to be continued either in an anterior or posterior direction, until about the sixteenth part of a circle has been formed. This will not only provide for good drainage, but will insure the opening remaining patulous long enough to admit of after-treatment.

There are two principal reasons, then, why so many cases of acute suppurative otitis media do not yield to treatment in the initial stage. In the first place, if the membrana tympani ruptures spontaneously, the opening thus formed is usually situated in the superior part of the membrane, which only allows pus to escape by the process of overflow; furthermore, pressure sufficient to produce rupture frequently causes maceration and peeling off of the mucosa. Auto-infection, therefore, occurs on account of the cavity being constantly filled with pus up to the point of perforation. Again, the edges of the ruptured membrane are irregular, consequently they do not coaptate readily, nor unite kindly; whereas, a clean incision will always repair with the greatest facility. On the other hand, if only a puncture of the membrane is made, the opening is too small to provide for adequate drainage.

The logical measures, therefore, to be employed in the evacuation of pus from the tympanic cavity, is, as above stated, a free incision of the membrana tympani, but never to commit the folly of a simple puncture. The practice of so-called paracentesis is non-surgical in so far as it relates to otology, and in order that the future shall be free from the inefficient treatment this procedure has engendered in the past, the word should be dropped from aural literature.

In considering the treatment of an acute suppurative otitis media, therefore, it must be assumed that every effort has been made to arrest the progress of the disease before the formation of pus. If, however, pus formation has already taken place, there is, of course nothing to do but evacuate it in the manner above stated.

The classical indications for incising the membrana tympani are in some cases as unreliable and misleading as the classical rules are for operating on the mastoid. Generally speaking, it is well to wait until some bulging of the membrana tympani occurs, but a grave error will have been committed if we wait for this symptom to become prominent in ear diseases complicating the exanthemata, epidemic influenza or pneumonia. As these cases are usually purulent from the very inception of the disease, it is important that an *early* incision of the membrane should be made, even though bulging has not yet occurred. This is especially true if the pain is severe and not influenced by blood-letting and the employment of other measures for relief. Should the suffering continue for some time after thorough evacuation of the pus, and an examination shows the presence of the streptococcus or the bacillus of influenza in any considerable number, the patient's future health, as well as conservative surgery, will be best served by an immediate opening of the mastoid.

After evacuation of the fluid from the tympanic cavity has been accomplished, many cases will make a good recovery by cleansing the canal and middle ear with an antiseptic solution, followed by introducing a strip of iodoform gauze well into the deep canal, to provide for good drainage, this to be renewed every day or two. It is well to keep in mind, however, that the two essential elements for the rapid development and multiplication of bacteria are heat and moisture. The treatment in many cases, therefore, must be directed to the avoidance or correction of these elements, as the site of a suppurative otitis media is a veritable hot-bed for the propagation of disease germs. Our chief object, then, in such cases is the application of therapeutic measures to rid the ear as far as possible of these bacteria, and endeavor to inhibit their further development by the destruction of the very pabulum of their existence through the reduction of inflammatory heat and by keeping the propagatory surface dry. After the secretions have been removed by inflation, irrigation, or a cotton carrier, the surface can be gently dried with cotton and hot air, and then dusted with some impalpable powder, such as boric acid or aristol, care being taken only to *dust* the surface, as an excess of powder would become impacted and interfere with drainage.

The general health must not be neglected. Absolute rest in bed, with free diuresis and properly conducted diaphoresis are of the first importance. The bowels should be freely opened, and the diet restricted to milk and broth. Indeed, one or two days of absolute fasting, and enforced rest in bed will frequently accomplish more in prophylaxis than any other single or combined therapeutic measures.

ETIOLOGY, PATHOLOGY AND SYMPTOMATOLOGY OF CHRONIC SUPPURATIVE OTITIS.

BY CHARLES W. RICHARDSON, WASHINGTON, D. C.

The most frequent cause for the existence of a chronic middle ear suppuration is the transformation of an acute suppuration into one of chronicity, however this chronicity may be induced. The various ways by which this chronicity may be induced are as follows:

1. By neglect or inappropriate treatment of the acute stage; This form of chronic suppuration usually responds readily to judiciously applied local treatment.

2. Through the existence of certain types of constitutional invasion that exert an unfavorable influence on local lesions. Such constitutional conditions are scrofula, tuberculosis, syphilis, anæmia and marasmus.

3. Through the occurrence of acute suppurative otitis during the invasion of certain of the acute infectious diseases, as scarlet fever, measles, diphtheria and typhoid fever.

4. The virulence of the infection and the character of the bacilli present.

5. The acute invasion of the attic is very prone to terminate in chronicity.

6. Through local changes excited at the time of the invasion, or those taking place during the progress of the case, such as: (a) The development of granulation tissue about the membrane or walls of tympanic cavity; (b) Through periostitis or caries of ossicles or tympanic wall; and (c) Through retention and inspissation of purulent discharge.

7. Through local changes within the nasal and naso-pharyngeal cavity.

All forms of chronic suppurative otitis are not secondary to the acute type, as we have a class which is essentially chronic from the moment of its invasion. In this class belong those chronic suppurative otitides due to tuberculosis, anæmia and diabetes.

The pathological changes in the condition under consideration are not limited to the confines of the tympanic cavity, but usually extend from the tube to the mastoid cells, and from the labyrinth to the auditory canal, involving to a greater or less extent the between lying structures. The epithelial structures are markedly

altered. There is frequently epithelial denudation and necrosis. In those areas where the epithelium is denuded, we have the development of an active papillary granulation tissue, containing cysts. The mucous membrane is generally infiltrated, and consequently many times increased over its normal thickness. The infiltrate is made up of small round cells, with increase in the number and size of the blood vessels. As a result of the development of the papillary granulation tissue, we have the formation of distinct buds, which, if further projected, form polypi. These buds are seen projecting from the ossicles, tympanic walls and the periphery of the perforations in the membrane. In uncomplicated cases, the bone is not usually affected. Caries and necrosis of the ossicles is the most common form of bone lesion in the disease under consideration. On account of its limited nutritive supply, the incus is the ossicle most frequently affected. The invasion of the incus may be in the form of caries of its long process or body, or that of necrosis of these parts; or complete necrosis of the whole bone. The malleus is almost as frequently involved, which may be in the form of caries of the malleus head or the tip of the long process or necrosis of one or both of these parts. The stapes is but rarely affected. As a result of caries affecting the ossicles at their articular surfaces, through the disintegration of the ligaments, or the contraction of surrounding fibrous bands, we occasionally have dislocation of the ossicles, most frequently affecting the malleo-incudal joint. The carious process may extend to the walls of the tympanic cavity, especially affecting the tegmen tympani and the outer wall, and that portion of the external wall which is formed by the auditory plate of the temporal. The inner wall is only rarely affected, such invasion usually occurring in tubercular cases and in those secondary to scarlet fever and diphtheria.

The membrane always presents the external evidences of the changes which have been wrought within the tympanic cavity. There is almost always destruction of the membrane, to a greater or less extent. The remnant of the membrane varies according to the degree of the activity of the process. At times, the membrane is congested and infiltrated both in the cuticular and mucous layers; at other times, it is opaque from degenerative changes, and showing here and there chalk deposits. Very frequently the cuticular layer extends over the edges of the perforation, thus rendering the perforation permanent. From the continued irritation of the purulent discharge passing through the auditory canal, we have a resulting dermatitis of the canal. The dermatitis produced in the canal is occasionally followed by an atresia of the auditory canal.

The mucous membrane of the Eustachian tube is like that of the tympanic cavity infiltrated. There is an increase in the size of the acinus glands. The epithelia are frequently denuded.

The changes in the mastoid during chronic suppuration are the most important changes which take place in this serious lesion. These changes are:

1. Congestion, swelling and polypoid degeneration of the lining of the antrum and the mastoid cells.
2. Complete obliteration of the antrum and mastoid cells through granulation like development of the lining of the antrum and mastoid cells.
3. Osteo-sclerosis of the mastoid.
4. Accumulation of muco-purulent and purulent secretion in antrum and mastoid cells.
5. The formation of cholesteatoma in mastoid.
6. Circumscribed or extensive caries or necrosis of mastoid.

Symptoms. Frequently the most pronounced and characteristic symptom of chronic suppuration of the middle ear is the presence of a discharge from the ear. The amount and character of this discharge varies not only in the same case at different times, but varies greatly in different cases. The amount may be as great as to show an almost continuous discharge from the canal, requiring frequent cleansing or changes of cotton, to the fraction of a drop during the twenty-four hours. The discharge may be offensive from want of cleanliness, from caries or necrosis, or from cholesteatoma. The discharge may be red, reddish brown, dirty green, or black in color, according as it is mixed with blood, cerumen, epithelial debris or micro-organism. The discharge may be thick, creamy, mucoid, or watery in character. The discharge may cease entirely for intervals and then recur. Pain is an infrequent symptom in connection with this form of middle ear affection. Pain may be occasioned by an acute exacerbation, by granulations filling in the perforation thus preventing free escape of pus, and through the accumulation of purulent discharge in the antrum mastoideum. Caries and necrosis of mastoid and osteo-sclerosis are accompanied by pain over mastoid and parietal regions.

A frequently recurring head symptom is the feeling of pressure, or actual head-aching often a symptom of increased labyrinth pressure or hyperæmia of the meninges. Vertigo is occasionally present. Vertigo, with unsteadiness of gait and vomiting, is usually indicative of caries and necrosis, although it may be produced through inter-labyrinth pressure. The most serious case of vertigo, vomit-

ing and total inability to locomote that I ever saw was due to a small growth in the region of the oval window, which was completely relieved by its removal. Subjective noises are occasionally present, but are not so constant as in the adhesive form of catarrh of the middle ear. They are seldom continuous.

Alteration in the sense of taste is also noted as a result of changes in the chorda tympani nerve.

The amount of impairment of the hearing varies greatly. The degree of the impairment of hearing varies also in the individual case at different times and under varying circumstances. The degree of the impairment of the hearing is dependent on the amount of primary injury; on the secondary changes which result through the persistent suppuration; and to sclerotic and degenerative changes. In the individual case, the variation in the hearing is dependent upon the weather, the amount of the discharge, the patulous condition of the Eustachian tube, the more or less activity of the inflammation in the tympanic cavity, and granulation and adhesive changes about the ossicles and windows. It is frequently noted that individuals hear fairly well as long as there is a moderate discharge, who become quite deaf when the discharge ceases.

The conditions of the membrane and visible portion of the tympanic cavity vary so in this disease that it is almost impossible to give a typical representation of this lesion. The appearances also vary according to the activity or non-activity of the inflammation. The position of the perforation is most frequently the anterior-inferior quadrant, then the posterior and superior quadrant, while frequently the whole membrane is destroyed. The rarer form of perforation is that through Shrapnell's membrane. The form of the perforation also varies greatly. It may be circular, oval, kidney shaped or irregular in outline. The number is subject to only slight variation. One perforation is almost the rule; although we occasionally have two and very rarely multiple perforations. The size of the perforation varies from that of a pinhole like destruction to the loss of every vestige of the membrane.

The appearance of the remaining membrane varies greatly during the active stage. It may have a dull white appearance, due to thickening of the epithelial layer, or chalk deposits. The color of the membrane may show also a yellowish-red to one of intense congestion. The border of the perforation is usually more highly colored than the remainder of the membrane. The tympanic cavity shown through the perforation gives evidence of varying degrees of congestion and infiltration of the mucous lining. The periphery of

the perforation in the membrane may be free or it may be adherent at one or more points throughout its circumference to the inner tympanic wall; also fibrous bands may be formed between the membrane at the edge of the perforation and the tympanic wall. The long process of the malleus often becomes adherent to the promontorium. As result of great activity in the mucosa and the formation of villous prolongation from the same, as well as from the result of caries, we occasionally have the development of granulation or polypi on the tympanic wall; from carious ossicles we have the same result. These growths, when small, manifest themselves as slight elevations from the mucosa, giving off a distinct light reflex; when large, they project from the atrium, or attic, into the auditory canal, and can be readily recognized as distinct blood-red tumors which bleed readily when touched. The auditory canal may not only be the seat of a dermatitis for the irritation of the discharge, but there may also develop from its wall granulation masses. Atresia of the auditory canal is also an infrequent condition. In making a diagnosis of chronic suppurative otitis, it is essential that the auditory canal and the tympanic cavity should be freed from all presence of purulent discharge. The cleansing can be made either through the use of the cotton-holder or by the use of mild irrigation. Where the discharge is so limited in quantity as simply to form a hard blackish crust around the perforation and the circumference of the auditory canal, due care should be exercised in the removal of the crust, as the granulating tissue on which they rest may bleed, and thus prevent a thorough inspection of the seat of the disease. The circumference of the perforation, the condition of Schrapnell's membrane, the presence of all or absence of any of the ossicles and the condition of the changes within the tympanic cavity should be noted at this inspection. The region should then be carefully gone over with a probe for the purpose of detecting caries or necrosis.

THE TREATMENT OF THE COMPLICATIONS OF OTITIS MEDIA SUPPURATIVA.*

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In dealing with the treatment of the various complications of this disease, I shall endeavor to take up those pathological conditions which usually are found first affected and shall speak of them in the order in which they have been encountered clinically, following a suppuration of the middle ear.

In discussing the technique of treatment, I shall omit all the usual antiseptic details, beyond mentioning now, that in aural surgery as in all forms of general surgery, the success of the operation and the future outcome of the case—depends entirely upon our complete and absolute asepsis, both at the time of operation and during the treatment following it.

One of the first and most frequent complications following this disease, is a destruction, partial or complete, of the membrana tympani; and our first endeavor is to remove whatever cause, if there be any existing, which has produced this condition. For this reason a careful examination of the nose and naso-pharynx should be made; and, should any obstructions exist in one or both localities, they should be removed, as in children a very common cause of middle ear suppuration and the sequelæ following, is the presence of adenoid tissue in the pharyngeal vault.

For the lesions found in the drum membrane, the first cardinal principle is to maintain cleanliness of the structure to be healed, and then apply an astringent solution to the indolent edges of the perforation. The solution from which the best results are obtained is one of silver nitrate, ranging in strength from a very weak solution to one of saturation. A drying powder is then insufflated over the surface; the ones giving the best results are zeroform, boric acid, aristol, or acetanalid. Several such applications are necessary to close in the solution of continuity existing; and when healing has taken place, the impaired function of audition in adults or those nearing that age, is rapidly improved by catheter inflation and vaporization of the Eustachian tube and middle ear, while in young children the Politzer bag is found useful. In a small number

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of the cases seen, the opening in the drum membrane remains despite treatment, and here a speedy closure is many times brought about by fitting a thin piece of sterile paper, previously dipped in vaseline, over the opening, and gumming it securely to the drum surface, thus making the ear chamber a closed cavity from without. One or two of these is usually found sufficient to promote healing. Flexible collodion applied over the perforation will accomplish the same purpose.

In a very small percentage of these cases, the opening will never close, but will remain dry except during an acute naso-pharyngeal attack.

The condition most commonly found next is the presence of granulation tissue, or a polypoid mass protruding through the opening in the drum membrane, and having its origin from the upper and inner wall of the tympanum. These masses are easily removed with a sharp curette, first cocaineizing their base, and applying a solution of adrenalin to prevent hemorrhage. After the removal of the mass, the base left is cauterized, and the external auditory canal packed with a wick of gauze for twenty-four hours—at the end of which time it is removed, and the parts wiped dry and powdered, to hasten the formation of the cicatrix.

Thickened and cedematous mucous membrane is often found, and this can be reduced and rendered healthy by irrigations of a warm saline solution, or the application of an astringent to the swollen membrane.

Necrosis of one or more of the ossicles is a very frequent complication; and when this occurs they should be removed through the external auditory canal—provided there is not and never has been any infection of the mastoid. If, however, the mastoid is diseased at the same time, then the radical Schwartz-Stacke operation should be done, and the diseased bones should be removed through the posterior wound. It is rarely ever found necessary to remove the stapes; and care should be taken not to disturb its position relative to the oval window.

In many cases where the ossicles are removed, the audition can be improved if we divide the adhesive bands around the stapedial foot plate. This procedure can easily be carried out after the malleus and incus have been removed. The incus is the ossicle usually the first to be attacked by the necrotic process, on account of its limited blood supply; and many times an ossiculectomy is done, and the incus is found wanting, having been completely destroyed by the suppurative process.

Again, many times from our examination before operation we are confident the ossicular chain is extensively diseased, and yet when the malleus and incus are removed, they are found practically normal, the disease having been confined to the adjacent tympanic walls, and the diagnosis by exclusion, prior to operation, is practically impossible. After removal of the ossicles, the tympanic walls and vault are gone over carefully with the curette, and all granulation tissue and softened bone removed. Extreme care should be observed to thoroughly remove all diseased tissue in and around the tympanic opening of the Eustachian tube, for if we leave any vestige of disease at this point, it not only retards healing but will prevent the formation of a firm cicatricial scar at this point—a condition most essential for a perfect result.

After the tympanic cavity has been cleared of all diseased tissue, and wiped as dry as possible, it is packed with a wick of iodoform gauze, introduced through the canal. This should be removed in twenty-four hours, and the parts manipulated as little as possible thereafter; for the less the manipulation, the more quickly do we obtain healing.

When there is a perforation of the tegmen tympani, and this be discovered during an ossiculectomy, we should at once proceed to do the posterior operation, and throw the mastoid cavity (or a portion of it), the middle ear and external auditory canal all into one; as otherwise it would be impossible to remove all of the dead bone through the opening of the external auditory canal.

If this were not done, the manipulations at the tegmen might cause an irritation, and very disastrous results might follow to the patient by an infection spreading to the dura or brain.

Diffuse circumscribed external otitis or furuncle of the external auditory canal is frequently seen during a purulent discharge from the middle ear. Abortive measures, such as dry external heat, and the application of soothing ointments can be used, but a free incision followed by curetting and drainage, if deep, will relieve the condition more quickly than palliative means. After opening, warm irrigations are comfortable, and serve to keep the canal free of discharge. Quite frequently, subsequent incisions are necessary, as this condition is prone to occur in groups rather than singly.

Mastoiditis:—This may be encountered either acute or chronic. If acute, and seen during its incipency, all rational measures should be used to prevent its further progress. At the outset, a careful examination of the middle ear should be made; and, if the drum membrane is found bulging, or a rupture has taken place and the

cavity of the middle ear is being insufficiently drained,—a free incision should be made in the drum membrane so as to promote drainage. The patient should be placed in bed, and *absolute* rest enjoined.

The bowels should be moved freely, and a fluid diet prescribed. If tenderness is at all marked over the mastoid antrum or tip, a Leiter coil or an aural ice bag should be applied for twenty-four hours. The external auditory canal should be irrigated with a warm solution of bichloride of mercury, of a strength of from 1 in 4,000 to 1 in 8,000 every three hours. If, at the end of twenty-four hours, the mastoid tenderness has not diminished, then further abortive measures are, as a rule, useless. If, however, the tenderness has perceptibly lessened, we can continue the use of the cold for twelve hours longer with beneficial results; and a fair proportion of the cases so treated will go on to resolution, with no further evidence of mastoid symptoms.

Dry heat applied over the mastoid has also in many cases brought about resolution.

A word of warning may not come amiss here in reference to the application of cold or heat, and that is—neither should be applied if the case be one of several days' duration; nor if there be any œdema over the antrum or above it, or a prolapse of the posterior superior canal wall—for if these conditions exist, the mastoid cavity is probably already infected, and the use of any abortive measures only tends to mask a further development of the process.

Another point of value, and one to which, I believe, we should pay the strictest attention, is the bacteriological examination of the discharge coming from the middle ear; for, given a case with only a slight amount of tenderness over the mastoid when first seen—if the microscope shows that the preponderance of infection be that of the streptococcus, then, I believe that no matter what abortive measures are used in the attempt to stop the process, the majority of cases will go on to operation. Such an examination will certainly aid us as to future prognosis.

I shall not give in detail here every step of the mastoid operation, but will speak of some of the most important points in its performance.

A thorough exposure of the process is always necessary, and the tip should be freed from its muscular attachment. The antrum should be entered first—a free communication established between it and the middle ear cavity by way of the aditus-ad-antrum. All diseased tissue found should be removed, and the tip should never

be left untouched. Careful search should be made for infected medullary spaces or cells, and this is especially true of the cellular structure of which the root of the zygoma is formed. Should softened bone be found around the sigmoid sinus, it must be removed, as well as any portion of the inner table which may be found diseased.

A suggestion as to the too forcible use of the curette in the bend of the aditus leading to the tympanum may be of value; for in this situation, if a sharp curette be used energetically along the floor, and there be much softened bone encountered, we are liable to injure the facial nerve by the removal of a portion of the superior wall of the canal through which it passes.

Care should be taken not to leave the posterior canal wall too prominent, for if there be a deep cavity behind it, the auricle, in healing, is liable to be displaced and thrown forward into a more prominent position than it formerly occupied, causing an unsightly deformity. This can be easily avoided by removing a small portion of the superior border of the canal wall with the forceps or curette.

If the diseased bone extend posteriorly farther back than the flap can be retracted, then a transverse incision through the posterior flap should be made, so as to facilitate a further exposure for removal. If this be done, care should be taken not to injure the mastoid emissary vein which is in this region, as it will delay the operation several minutes, owing to troublesome hemorrhage at its bony entrance. In cleansing the operative field before dressing, a warm saline solution followed by alcohol, is all that is necessary. A strip of gauze should be carried through the aditus to the entrance of the tympanum, and the cavity firmly packed with gauze; should any areas of dura have been exposed during the operation, they should be packed off from the general cavity by separate pieces of gauze in order to preserve them more safely from the possibility of infection. Two or three silk or silkworm gut sutures are used in sewing the superior angle of the wound. Should the transverse incision spoken of above have been made in the posterior flap, then these edges should be brought together also.

A dressing which gives the utmost comfort to the patient, so far as its first removal is concerned, is to use a sterile piece of rubber tissue, buttonhole it in several places, and approximate it closely to the bone cavity, then applying the gauze dressings directly over this tissue. If this be done, the removal of the primary dressing will be a painless procedure for the patient, as compared to a removal when the gauze lies in contact with the bony cavity.

The first dressing in the average case, provided no complications arise, need not be disturbed before five or six days.

Subperiosteal Abscess.—This occurs very frequently in neglected cases in children, and occasionally in adults; and, when encountered, should always be evacuated under anæsthesia; but we should not stop with the simple evacuation of the external abscess, but proceed further and open the mastoid process, and remove the disease already existing there, as the abscess in the vast majority of cases is secondary to a primary mastoiditis. In the few cases in which it is not—and they are in children—the pus burrows up from the middle ear, and finds its way beneath the periosteum. But even if such a condition exists, it is always safer for the future of our patient to explore the mastoid, and thus prevent the possibility of any subsequent trouble arising.

In a personal experience of forty-one cases of subperiosteal abscess operated upon in children, ranging from five weeks to eight years of age, pus was found in the mastoid process forty times. In the one case (six years of age) where it was absent, there was a large amount of granulation tissue and softened bone found, so that I believe it very unwise to merely open the subperiosteal accumulation and trust that nature will do the rest.

Adenitis.—This occurs very frequently along the course of the lymphatics behind and below the ear and down the neck along the course of the internal jugular vein, following a suppuration of the middle ear. The inflammation can often be relieved by hot applications or the use of ointments; a very serviceable one is the Ung. Hyd. Ammon. If they persist, causing a temperature, and showing evidence of breaking down, they should be removed under anæsthesia at once. In a Betzold perforation, a number of diseased glands is usually encountered, and they should be removed, as should also any found in the neck when resecting the jugular vein.

Pachymeningitis.—Sometimes called extradural, epidural and perisinus abscess. This is the most common of all the intracranial affections arising from chronic middle ear suppuration, and is usually an accompaniment of, or complicating, mastoiditis or sinus thrombosis or brain abscess. In the experience of the writer, it has been found more frequently as a complication of mastoiditis. When it is encountered, all softened bone should be removed and the pus evacuated. Many times we find only a few drops of pus, but plenty of broken down granulation tissue covering the dura. The pus and granulations should be removed, leaving a healthy dural surface beneath. When we find the exposed dura covered by a firm layer

of healthy looking granulations, it is best to leave these unmolested, as this is nature's barrier thrown out to protect the structures beneath. As a rule, the disease is limited by adhesions easily demonstrated by the forceps or probe, and they should not be disturbed, as very rarely do we find softened bone beyond the line of adhesions.

When a perisinus abscess is found, the utmost care should be exercised in working around it, so as not to injure the sinus wall or make an accidental opening causing hemorrhage. Should such an accident occur, the bleeding is easily controlled by pressing iodoform gauze over the point of injury, and the work of removing the remaining diseased tissue is resumed. The operative field is flushed with a hot saline solution, followed by flushing with absolute alcohol; the latter is a good hæmostat as well as one of the best disinfectants we have.

In dressing an epidural abscess, separate pieces of gauze should be placed over the exposed dura so as to wall off this area from any discharge which might come in contact with it from the surrounding cavity. As a rule, the dressings are removed and the field of operation inspected on the third or fourth day.

Sinus Thrombosis is met with as the next most frequent complication; and the lateral or sigmoid sinus is the one most frequently involved, and this involvement is usually accompanied by a pachymeningitis over or around the sinus, and is generally referred to as a perisinus abscess.

In dealing with this complication, the treatment of the sinus will be spoken of first—and secondly, that of the vein when involved.

In treating this disease, as in many other surgical cases, each individual case is a law unto itself. The first step is a complete and thorough exposure of the sinus, followed by a flushing of the operative field with alcohol to insure sterilization before opening the vessel. The part usually opened first is that lying above the bend or knee. Where formerly an aspirating needle was used to explore the sinus, we now incise the anterior wall with a scalpel. The reason for abandoning the use of the aspirating needle as a diagnostic aid in these cases is because many times a thrombosed sinus might contain a small clot, while the remainder of the vessel would be filled with fluid blood; and unless the point of the needle engaged the clot, fluid blood would be drawn into the syringe, thus giving a wrong impression of the condition existing within—or a small parietal clot might be present, and the needle would pierce this clot, and then go on into the lumen of the vessel, and draw blood into

the barrel of the syringe—whereas, if we use a scalpel to open the sinus, and a rather free incision is made, and the clot be a small one, it is washed out through the opening by the blood pressure from within. If a clot be present, then the dura covering the sinus should be more freely incised, and the clot, if large, removed with the curette, together with any pus and disintegrated material that may be found.

When the thrombus is removed and the blood flow established from the proximal end, hemorrhage should be allowed to continue for a few seconds, so as to remove any small clot or septic material that may be present farther back in the vessel. This hemorrhage is then easily controlled by packing a small piece of folded gauze directly against the opening in the vessel. The lower portion of the sinus is proceeded with in the same manner; and, after the removal of the clot and whatever pus and broken down material may be present, an attempt should be made to restore the circulation at the bulb. In about half the number of uncomplicated cases coming under our observation, this can be done quite easily; but in others, it becomes impossible without dangerous manipulation—by this I mean if very much time or effort be consumed by our attempt to restore the return circulation at the bulb, we run the chance of dislodging some foci of septic material from within the bulb; and having it thrown at once into the general circulation, thus increasing our systemic poisoning.

In those cases where the sinus does not contain pus, and the other symptoms have not pointed to a jugular involvement, it is better to cease our manipulations even though a return current of blood be not established. Cleanse the operative field and pack the sinus firmly at the bulb with gauze, rather than proceed any farther, as experience has taught us that a large number of these cases recover without resort to further surgical procedure. In all of the cases encountered, whether of the septic or non-septic variety, we should thoroughly expose the lower end of the sinus at the bulb, as here quite frequently lies the trouble, and not above; owing to its close proximity to the floor of the tympanic cavity; and this is especially true where we have a large jugular bulb to deal with. Care should be taken that no sloughing edges of dura be left, as they will only retard the healing process.

Thrombus of the Internal Jugular Vein.—If we find upon opening the sinus a disintegrated clot, or pus, or both present, we should without further delay expose, ligate at the clavicle, resect and remove the internal jugular vein of that side to its commencement at

the bulb, provided always at this time, the patient's physical condition will permit it. This prevents the possibility of any further infection being thrown into the general circulation through the medium of this vessel. To be sure, a still further infection can take place even after the vein has been resected, through the medium of the anterior and posterior condyloid veins, or the occipital sinus.

If the facial, maxillary, thyroids, or any other veins, be involved, they should be ligated beyond their point of infection, and removed also. Enlarged glands likewise, if found in the course of dissection, should be removed so as not to leave any field for subsequent infection. Care should be taken to separate the pneumogastric nerve from the vein at the lower point of ligation, as here the nerve and vein lie very close to each other, and are often matted firmly together, and are difficult to separate owing to the inflammatory exudate present in the severer grade of cases met with.

The wound in the neck should be flushed with a hot saline solution, and closed by a continuous silk suture to within a short distance of the bulb. A small piece of rubber tissue should be inserted in the lower angle of the incision for the first forty-eight hours to promote drainage. In our septic cases, when, after operation the patient does not progress as favorably as we think he should, the temperature remaining high, and there being only a partial subsidence of the general symptoms, and when we are doubtful whether any further operative procedure is demanded, it is wise to wait for a time before any other radical measures are taken; for we must remember the fact that we are dealing with a septic case which took several days to develop, with a gradual absorption into the system of a virulent poison.

In the experience of the writer it would be strange did not the case show, following operation, some evidence of this infection, so it is well to bear in mind in these cases that it takes time to eliminate the poisonous element absorbed, even though the source from which the infection emanated has been eradicated.

Should it be necessary to use stimulation during or following our operation, and the patient does not respond to the usual hypodermic stimulants in use, very beneficial results are derived from a direct transfusion of a normal salt solution into one of the veins.

If a thrombus of either the superior or inferior petrosal sinus take place, they should be exposed, the dura covering them incised, and the clot removed in the manner spoken of when dealing with the sigmoid sinus. The inferior petrosal is quite frequently thrombosed in connection with thrombosis of the bulbous portion of the sigmoid.

When this occurs, the clot is undoubtedly one of extension from the sigmoid sinus, and is very frequently removed while curetting the lower end of the sinus.

A thrombus of the cavernous sinus is almost always fatal although Dr. E. W. Day (Trans. of the Am. L. R. & O. Society, 1902) reports recovery from this disease in a case under observation in 1901.

Brain Abscess.—About 37 per cent of all cases of brain abscess are otitic in origin. The most common site for a subdural accumulation of pus is in the inferior and posterior portion of the temporo-sphenoidal lobe. While the treatment of this condition is the same, the mode of entrance into the skull differs, as many of the abscesses are discovered secondary to the opening of the mastoid; and in these cases the roof of the mastoid antrum, and the floor of the middle fossa are removed, exposing the dura through which entrance is made to the brain. A sufficient exposure of the dura is always essential, and all bleeding points should be stopped, and the dura sterilized prior to opening.

When there is an accumulation of pus just beneath the dura, or a short distance from it, the dura will be found somewhat darker in color, and at times slightly bulging.

The dura is incised with a scalpel sufficiently for exploration purposes, and care should be taken in making this opening not to cut any large dural vessels, as the hemorrhage is troublesome, and will prove a source of delay in operating. After opening the dura, a silk suture is passed through both flaps and is a distinct aid in retracting them, and injures the tissues less than when retractors are used.

There are several methods of exploring the brain, and all have their advocates. An aspirating needle of large size can be used, or the index finger, or a scalpel can be thrust into the brain substance, or especially devised forceps have been used. My own experience has led me to rely upon the scalpel and finger. When pus is found a sufficiently large opening is made to admit of its removal. The cavity can be cleansed by one of two methods; either very gentle irrigation with a warm saline solution, or a gentle mopping of the cavity with gauze. The less manipulation we do, and the more rapidly our work is finished after the brain has been opened, just so much the better are the chances of our patient for recovery.

Where a limiting membrane is present, the encephaloscope, devised by Whiting, is of advantage in exploring the cavity. Drainage can be accomplished either by tubes or gauze wicks—the use of the latter has been more successful in my hands. The method of using them is to fold a piece of sterilized gauze into a wick about a

third of an inch in thickness, moisten with a saline solution, and roll in a powder composed of equal parts of iodoform and boric acid, after the manner advised by Macewen. The end of this wick is then placed in the bottom of the abscess cavity, and the brain tissue allowed to collapse around it. Sufficient soft gauze dressings are placed around the exterior so that any material reaching them through the gauze wick will be absorbed. Such a dressing is left in place from one to four days, depending entirely upon the size and condition of the cavity, and how the case does. At the second dressing, the cavity will be found very much contracted, and is cleansed in the same manner as before, and a much smaller drain or wick is introduced than at first, as our object is to help the cavity contract and grow small as rapidly as possible. Should any pocketing take place, its free drainage is called for at once.

When it is deemed advisable to explore the temporo-sphenoidal region first, an exposure of the bone is made $1\frac{1}{4}$ inches behind and $1\frac{1}{4}$ inches above the centre of the bony meatus. This can be accomplished in one of two ways—first, if we wish to explore only the temporo-sphenoidal region, a curved incision beginning at the root of the zygoma and extending backward for about two inches, will explore the above area; or, if our explorations are to be extensive and embrace other regions where pus is likely to be found, it is best to make an incision that will explore all the cranial cavities on that side, and this is done by displacing a semi-circular flap beginning over the zygoma just above the auricular attachment, and extending backward to the occipital protuberance. The periosteum is undisturbed except at the point we wish to enter the skull.

All bleeding points are stopped and the skull entered rapidly by means of the trephine or chisel, and sufficient space should be made to allow a thorough exploration, as the removal of a small button of bone is not sufficient.

When no definite localized symptoms are present, a favorable site for entering the skull is one inch above the centre of the bony meatus. This will enable one to explore the dura lying directly over the tegmen, as here its close proximity to the roof of the tympanum very frequently exposes to our view an epidural or subdural collection of pus; and many times we are enabled to discover a fistulous tract leading directly from the roof of the tympanum to a collection of pus in this region.

The utmost care should be exercised in searching for multiple abscess cavities, as they occur frequently, and are many times overlooked and found only at subsequent operations or upon autopsy.

Other regions of the temporo-sphenoidal or frontal lobe can be explored in the manner already described. The one principal point to bear in mind in opening into these various regions is that we should enter the skull at a point corresponding as nearly as possible to the floor of the lobe we are about to explore, in order that we may secure free drainage. Then, too, care should be taken not to injure unnecessarily the dura, as we need to retain all of this in as good a condition as possible so as to prevent a hernia cerebri forming, and to promote rapid healing.

In opening a cerebellar abscess the site of the opening depends on whether the mastoid has been previously operated upon, and the sinus exposed, or whether sufficient evidence be present to warrant our going directly into the cerebellum. If a mastoid operation has previously been done with or without exposure of the sinus, then the cerebellum is usually entered by removing sufficient bone directly behind and below the sinus. This removal is accomplished with the Rongeur forceps, and can be effected rapidly.

The cerebellar lobe is entered in the same manner as that already described in opening an abscess of the other cranial regions, and care should be taken to remove the bone sufficiently low to promote free drainage of the cavity.

Should we deem it advisable to explore the cerebellum primarily, the point of election for entrance would be in an average adult case $1\frac{1}{2}$ inches behind the centre of the bony meatus, and about one-third of an inch below this horizontal plane. An opening here would insure drainage at the lowest point of the cerebellum. The exposure and opening of the dura would be carried out in the same manner as that already described in exploring other regions of the cranium.

Meningitis.—When this is present as a complication, of aural supuration, and we are unable to find a localized area of infection, as in a pachymeningitis or general infection to which we may attribute the cause, then little or nothing is to be gained by surgical procedure. In such a condition, an ice cap placed over the head is of some advantage in allaying the pain, and renders the patient more comfortable. Large doses of the iodide of potassium are used internally; this drug is of especial value owing to the fact that there is always the possibility of a specific lesion, either hereditary or acquired. A meningeal complication is almost always a fatal one, although Macuen (*Pyogenic Diseases of Brain and Spinal Cord*) has reported several cases as cured, following an early operation.

Lepto-Meningitis is almost invariably fatal, although it would seem rational, when this condition is recognized early, to operate by exploring the infected area, cleanse with a warm saline or other solution, and freely drain the affected region. But even where this has been done, recovery has seldom followed.

Metastatic Abscesses.—When present in different parts of the body, should be evacuated, curetted, cleansed, drained and packed, and treated according to general surgical principles. When a metastasis of the intestines takes place, large doses of the bichloride of mercury should be given internally, and frequent flushing of the colon with a hot saline or warm boric acid solution should be given. I have seen three such metastases of the intestinal tract which owed their origin to one or more of the complications of aural suppuration, brought to a favorable issue under this method of medication.

Pyæmia is also largely treated in the same manner by evacuating any pus collections that may be present, and by the most rigid supporting treatment of the general condition. Injections of the anti-streptococcus serum are also of value in the treatment of this condition, and some very favorable results are ascribed to its use.

Facial Paralysis following a middle ear suppuration, is by no means uncommon. It is occasionally met with as the result of an attic suppuration, and here the indication would be to relieve pressure as speedily as possible, by making a free incision in the drum membrane, carrying it well upward so as to relieve the pressure in the vault. This should be followed by warm irrigations so as to diminish as rapidly as possible the existing swelling, and remove the inflammatory deposit. Absolute rest should be enjoined, free purgation established, and a fluid diet ordered. Should there be much pain accompanying this condition, dry heat, applied externally, will add greatly to the comfort of the patient. When such a condition does arise, it is probably caused by an inflammation of the chorda-tympani branch of the facial with an extension backward of the inflammatory process to the main trunk of the nerve. Should resolution be slow in taking place the interrupted galvanic current will hasten the restoration of nerve function. Paralysis of this nerve may also take place, caused by a suppuration of the structure within or adjacent to the middle ear. In this condition the removal of any diseased bone, granulation tissue or other inflammatory product, such as a cholesteatomatous mass that has produced pressure, will enable the nerve to again perform its function, and if the resumption of function be delayed after pressure has been removed, the use of the current as already spoken of, will in nearly all cases bring about speedy relief.

When paralysis occurs several days after an operation for the removal of dead bone, as in the so-called Stacke or radical operation, and there is no solution of continuity over or around the facial canal, the cause of such paralysis can, I believe, be explained in one of two ways:—either concussion over the canal at the time of operation, and later, an inflammation arising in the nerve trunk—the result of this concussion—, or it is due to the destruction of the facial branch of the chorda-tympani in the tympanic cavity; and from the point of severance of this branch an inflammation, the result of this trauma, may travel backward through the bony opening, and in this way cause a temporary swelling and infiltration of the sheath, exerting pressure on the main trunk of the nerve, thus temporarily suspending its function.

All of these types of paralysis will get well without any treatment whatever, but the restoration of function can be hastened by bringing to its aid the use of the electric current.

When a facial paralysis takes place immediately following an operation on the mastoid or middle ear, it is a fair presumption that the nerve has either been slightly injured, or partially or completely severed. Here the treatment would be, if injured, the same as if due to the causes before enumerated; but the re-establishment of function would not be nearly so rapid, and would entail constant treatment over a period of several weeks or months. If the nerve has been severed, and we are fortunate enough to find the divided ends, an attempt can be made to splice them together, and, if successful, the nerve may be stimulated later in the manner already spoken of. If the nerve be cut low down in the soft tissue, it can be sutured to the spinal accessory; this has been done a few times, but the result is not entirely satisfactory.

In all cases of paresis of this nerve following operation, we should use all means at our command to try and re-establish partial if not complete function; and, I believe, the best means to enable us to accomplish this is by the use of the interrupted galvanic current, together with systematic massage of the affected muscles, and appropriate tonic treatment.

Labyrinth.—Its invasion as a complication of this disease is not uncommon, and when it exists the treatment should be both surgical and medical. The surgical part of the treatment consists in the relief of all pressure around the stapes, oval and round windows, as bands, adhesions or cholesteatomatous deposits. When adhesions or bands are present, they should be divided, and, if possible, removed until all pressure in this region has been relieved.

The medical treatment consists in placing the patient in bed if possible, and administering pilocarpine muriate hypodermically in full doses, for a period of at least six weeks, two months or longer. If it be impracticable to place the patient in bed, then the drug can be given internally in an aqueous solution two or three times a day, and the patient still be allowed to go about and perform his duties. If given by the mouth, it is well to start with four to six drops of a two per cent solution, and increase the dosage as we find our patient can tolerate the drug. The cases in which it is given, should be cautioned against taking cold during the sweating stage. Strychnine in full doses is also of benefit, and can be advantageously combined with pilocarpine. If there be a history of acquired or hereditary syphilis, or this condition be suspected, iodides should be given to the physiological limit.

For the temporary relief of the distressing subjective sounds accompanying this condition, potassium bromide can be given in full doses; likewise large doses of hydrobromic acid will often diminish these sounds.

All drugs or stimulants that cause even a temporary congestion of the labyrinth should be prohibited, and the general health maintained as near the normal standard as possible.

The upper respiratory tract should receive attention, if needed, so as to avoid any sudden variations in the circulation which might affect the labyrinth. Should both sides be involved in the same patient, then but little benefit is derived, no matter what measures are instituted for relief, whether surgical or medical. Vibratory treatment for this condition by means of forks, tubes, and variously devised instruments, has been advocated and used, and some report favorably upon their results. Personally I have had little if any success in using them.

There is one form of vertigo associated with this disease that yields readily to mechanical treatment. I refer to the vertigo caused by a partial occlusion of the Eustachian tube in residual cases. Here inflation and vaporization improve the cases rapidly, and after one or two treatments, the patient may go for several months without another attack.

Cholesteatoma.—These masses are of frequent occurrence following middle ear suppuration, and their treatment consists in their complete removal.

If the mass be small in amount, it can sometimes be entirely removed from the tympanum through the external auditory canal; but a safer and much more complete method of removal is to perform a

typical Stacke operation, as here we have the whole tympanic cavity exposed, and can remove every vestige of this deposit, and, at the same time, see what we are doing.

After the middle ear chamber has been freed from all disease, skin grafts can be applied through the external auditory canal to the bony cavity within; and when so applied, they hasten the healing process, and cut short the period of convalescence.

Septic Synovitis.—When present, should be treated from a general surgical standpoint.

Septic Pneumonia or Pleurisy should receive the appropriate treatment usually followed out in such cases.

Ulceration of the Carotid Artery has been caused as a direct result of a chronic purulent ear discharge. Should such a condition occur, the treatment would be, of course, ligation.

To the general practitioner of the future will belong the credit of a decrease in the number of cases of chronic purulent ear disease and their sequelæ; for, if recognized and treated early, an acute otitis need never reach the chronic stage. When, however, this stage of middle ear disease is encountered, no time should be lost in rectifying the pathological conditions found, so that the patient may retain his audition, and also to prevent the possibility of any of the complications, enumerated in this paper, taking place.

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THE TECHNIQUE OF THE RADICAL OPERATION FOR CHRONIC SUPPURATIVE OTITIS MEDIA.*

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I have already written so fully upon this subject, at a previous meeting of this Society, and it is with some hesitation that I present the following paper to you. I beg to say that I do so only at the urgent request both of our honorable President and of our distinguished Secretary.

As I do not wish to take up more than a few moments in presenting the paper, I will proceed immediately to the consideration of the subject with which we have to deal.

The patient, if possible, should be placed in the hospital or under the immediate supervision of the surgeon, at least twelve hours before the operation. The hair should be shaved over an area of three inches from the centre of the meatus, in every direction. This point is of great importance. Female patients frequently object to this thorough shaving of the hair, especially of that portion of the head lying just above and in front of the line of superior auricular attachment. It is of the utmost importance that the shaving be thorough and complete, if a good result is to be obtained. I have found not only that female patients object to this preparation, but males also, who wear a beard.

Too much stress cannot be laid upon a thorough preparation of the field of operation. The hair and beard constitute, probably, the most fruitful source of infection of the superficial wound in these cases. It is, therefore, necessary that the area immediately surrounding the field of operation should be thoroughly denuded of hair. After thorough shaving, the ear is irrigated with an aqueous solution of bichloride of mercury, of a strength of 1-5,000, and the external auditory canal is packed as far as the fundus, with a strip of iodoform gauze. The entire shaved area and the auricle are then carefully scrubbed with tincture of green soap and sterile water; they are then rinsed with sterile saline solution, to remove all the soap, then with an aqueous solution of bichloride of mercury, of a

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strength of 1-1,000, and last of all are thoroughly wiped off with equal parts of alcohol and ether. A sterile dressing is then applied, so as to cover the entire field of operation, including the auricle. This dressing is left in place until patient is under the anæsthetic, and the operator is ready to make the primary incision.

At the time of operation, the operative field is surrounded either with dry sterile towels or with sterile towels wrung out in an aqueous solution of bichloride of mercury, of a strength of 1-1,000. All instruments are previously thoroughly sterilized by boiling. The hands of the operator and of his assistants are thoroughly sterilized, and it is my practice to not only myself wear sterilized gloves, either of cotton or of rubber, but to insist upon my assistants doing the same.

The initial incision begins over the tip of the mastoid process at a point a quarter of an inch behind the insertion of the lobule. The incision runs upward and backward in a curved line, so that at a point opposite the centre of the meatus it lies, at least three-quarters of an inch behind the line of auricle attachment. It is then carried upward at this distance behind the line of auricular attachment, and to a point just above the apex of the auricle. From this point it is carried downward and forward over the top of the ear to a point one-half to three-quarters of an inch in front of the anterior termination of the helix. It is important to make the incision as nearly as possible along these lines. If the incision is carried too close to the auricle, the external surface of the mastoid will be insufficiently exposed and in order to remove all carious bone, it may be necessary to strongly retract the posterior flap, or in other words, to undermine this. While it is sometimes necessary to do this, in spite of the cutaneous incision already described, it is always undesirable, and may be avoided in most instances, if the incision is made as far behind the ear as I have directed. It is also of great importance, in completing the upper portion of the incision, to make it in a horizontal direction or in a direction forward and slightly downward over the top of the ear. If this is not done, it will be found almost impossible to thoroughly expose the upper wall of the bony canal, and to remove the external wall of the tympanic vault. All surgeons who have performed this operation, know it is just here that the operation frequently fails. It is, therefore, necessary to extend the incision well forward in a horizontal direction in order to make a complete exposure of the upper wall of the bony external auditory canal, and to enable the operator to thoroughly remove the outer wall of the tympanic vault. After the incision has been made in the manner described, all bleeding points are grasped with clamps, and

the anterior flap pushed forward by means of the periosteal elevator, exposing the posterior, superior and inferior margins of the bony meatus. With a narrow, blunt dissector the fibrocartilaginous meatus is carefully dissected out of the bony tube which it lines. In most cases, if care is used, the fibrous meatus may be preserved intact for a length of one-third to three-eighths of an inch beyond the margin of the bony meatus. The anterior flap being held in position by means of a retractor, the surgeon next proceeds to enter the mastoid antrum in the region of election, that is, in the suprameatal triangle. In the majority of cases which present for the radical operation, the mastoid will be found sclerosed, and the antrum will never be entered until an opening has been made in the bone, at least half an inch in depth, and frequently more. Where the antrum lies deeply—and it does in the large majority of these cases—the operator will do well to enlarge the funnel-shaped opening by which he is to enter the antrum, by removing the cortex from below, and even invading the posterior margin of the bony canal. As the funnel-shaped opening in the bone is deepened, the operator may remove the cortex as far down as the level of the floor of the meatus and may work cautiously backward for a distance of a fourth of an inch behind the posterior margin of the bony meatus. It is unwise to broaden the funnel above. Sufficient space can always be gained by working close to the posterior wall of the canal and removing the bone below. In this way, the operator works on until the probe enters the antrum and passes through this cell and through the *aditus* into the tympanic vault. Exploration with the probe will then enable the operator to judge as to the size of the antrum in each individual case, and its extent either backward, upward or downward. It is then wise to enlarge the opening in the antrum by a few strokes of the gouge, so that its inner wall can be easily seen. The operator should then turn his attention to the fibrous meatus which we will remember, has been carefully dissected up from the bony canal. The fibrous meatus should be divided posteriorly, as close to the tympanic ring as possible. This division may be effected either by a sharp scalpel, cutting from behind into the lumen of the meatus, or accomplished by angular knives devised for the purpose, which are introduced into the meatus through the posterior opening, the posterior wall of the canal being invariably opened at its deeper portion during the process of dissecting it up from the bony canal, and the soft parts divided by an incision at right angles to the lumen of the meatus. In this way, the auricle and fibrous canal constitute a funnel-shaped flap which, by forcible traction may be completely

pulled out of the bony meatus. The retractor holding the anterior flap forward, should next be removed, and a strip of iodoform gauze should be threaded through the external auditory meatus and brought out through the opening in the posterior wall of the canal. The two ends of this gauze strip are then tied together, and this fillet is used as a retractor to pull the auricle forward and to pull the fibrous meatus out of the bony tube which it lines. The operator next proceeds to break down the partition between the mastoid antrum and the external auditory meatus. This is best done by removing the posterior wall of the canal by chiseling upward toward the mastoid antrum. Above, the posterior wall of the canal is cut through by carrying the gouge or chisel directly inward on a plane slightly above the superior wall of the bony canal. As the wound is deepened above along the plane of the upper meatal wall, that portion of the external wall of the attic, formed by the junction of the posterior and superior walls of the meatus, will come into view. This bony segment should next be removed by the gouge, the instrument being directed upward and inward, so as to remove this portion of the outer wall of the tympanic vault. In this way, the *aditus ad antrum* is exposed and forming its floor will be seen the prominence of the horizontal semi-circular canal and closely amalgamated with this, the aqueductus Fallopii, lodging the facial nerve. The position of this bony ridge varies considerably in different subjects, sometimes lying rather high up and sometimes much lower down, and the operator should always proceed carefully in the removal of the posterior wall of the meatus, until the *aditus* has been entered, and these important landmarks seen. As soon as the prominence of the horizontal semi-circular canal comes into view, the operator may proceed rapidly with the gouge, to throw the mastoid antrum, the external auditory canal and the middle ear into one large cavity, always remembering never to encroach upon the hard bony ridge which protects the horizontal semi-circular canal and the facial nerve. The remainder of the external wall of the tympanic vault should then be removed, that is, the entire inner extremity of the upper wall of the bony canal should be chiseled away, leaving only the thin internal table forming the tympanic roof and separating the middle ear from the middle cranial fossa. After the tympanic cavity, antrum and external canal have thus been merged into one cavity, the remnants of the two larger ossicula can be easily seen and extracted.

If the field of operation is carefully dried by means of gauze strips pressed firmly into the depth of the wound, allowed to remain there a few moments and then removed, the operator can make out the

head of the stapes, if this has not already been destroyed by caries, and can also see the nitch of the round window. In order to see the nitch of the round window and the region of the oval window perfectly, it is necessary to remove a thin scale of bone from the posterior wall of the canal, lying just below the prominence of the Fallopian aqueduct. Too much care cannot be exercised in performing this step of the operation, and yet it must be done in order to obliterate perfectly what might be called the posterior tympanic space or that portion of the cavity lying posteriorly to the posterior margin of the tympanic ring; in other words, the posterior meatal wall must be cut down until it is continuous with the posterior wall of the tympanic cavity, the tympanic ring being entirely removed at this point. After this is done, the nitch of the round window can be easily seen, as well as the head of the stapes, if the ossicle is in position, and if not, the foot-plate can be seen lying in the nitch of the oval window.

It is necessary, in these cases, to remove all diseased bone. It is not necessary, however, to completely obliterate the entire pneumatic structure of the mastoid, provided all of these pneumatic spaces have not been invaded by the destructive process. In most cases, subjected to this operation, the mastoid will be found either sclerosed or diploic. We are occasionally required to perform radical operations upon patients in whom the pneumatic structure of the mastoid is preserved. It is sometimes a rather nice question for the operator to decide, as to whether or not all of the pneumatic cells are to be obliterated. In my own experience, it has been easy to decide, however, when firm and healthy bone is encountered. In cases of chronic suppuration, operated upon simply for the relief of the chronic trouble, and in which no acute symptoms are present, the surgeon should not obliterate the pneumatic structure of the mastoid much beyond the limits of the diseased tissue, as by so doing an unnecessarily large cavity is formed. After the exposure of cells by the removal of the cortical layer of the mastoid process—if these are found to be healthy, it is not necessary, in order to secure a favorable result, to entirely obliterate these healthy spaces. After all diseased bone has been removed, these spaces may be treated as if they did not exist, and the soft parts may be sutured over them, closing the wound, exactly the same as they would be sutured over diploic bone tissue, or even over undisturbed mastoid cortex. After the bony cavity has been thoroughly curetted, and the operator has assured himself that no diseased bone remains, either in the middle ear or in the mastoid cells which have been broken down, attention should be

turned to the Eustachian tube. A small curette should be passed into the tympanic orifice of the tube, and any softened bone removed from this region. Remembering the relation of the internal carotid artery to the Eustachian tube, the curette must be used in this region with the utmost gentleness. The mucous membrane lining the tympanic orifice of the tube should, however, in every instance, be entirely scraped away from the bone. After the entire bony cavity has been curetted in this manner, it is well to smooth off the walls of the cavity, either by means of the curette or, better still, by the burr, actuated either by the electric or hand-motor, or by means of a large burr or osteotribe, which is easily manipulated with the hand. Such an instrument is not at all essential to the thorough performance of the operation, but it certainly does enable the surgeon to smooth off the bony walls of the cavity with great rapidity, and perhaps, somewhat more perfectly than can be done with either the gouge or the sharp spoon. The osteotribe has another advantage, in that as it removes but a thin layer of bone, and removes this in so finely a divided form, that it does tend to check somewhat any oozing from the walls of the bony cavity. The entire cavity is now firmly packed with sterile gauze.

After the cavity has been smoothed in any of the ways above described, it should be firmly packed with a strip of sterile gauze. The next step is the formation of cutaneous flaps from the fibrous meatus and the concha in order to line this bony cavity as completely as possible with epidermis. Several methods are in vogue for the formation of these flaps. The simplest method is to split the posterior wall of the fibrocartilaginous meatus by a horizontal incision from a point where it is divided close to the drum membrane, outward along the posterior wall of the canal to the concha. In this way, two triangular flaps are formed, one of which can be sutured to the periosteum above and behind the bony opening and the other to the periosteum below and behind the bony opening. In this way, the deep portion of the fibrous meatus is spread apart, as it were, and by means of the sutures passed in the manner described, is held more or less closely in contact with the upper and lower wall of the bony cavity. The sutures used should be of strong catgut, and should be passed through the entire thickness of the meatus, at a considerable distance from the cut margin, and should also pass through the periosteum at a considerable distance from its cut margin, so that when traction is employed upon these sutures, quite a little force may be used without the danger of their pulling out.

Another and better method of forming the flaps is by continuing the horizontal incision along the posterior median wall of the canal out to about the middle of the concha. From the conchal extremity of the horizontal incision, one vertical incision is made upward and another downward. In this way, two quadrilateral flaps are formed; the one composed of the upper and posterior wall of the fibrous meatus and the corresponding portion of the concha, the other of the inferior and posterior wall of the meatus, and the corresponding portion of the concha. The conchal cartilage included in each of these flaps is then dissected out, and each of these flaps folded back upon itself, that is, the lower flap downward, and the upper flap upward, and these flaps are stitched in position, raw surface to raw surface, by means of fine catgut sutures. It is sometimes wise, in addition to these stitches, to introduce the deep retention sutures, of strong catgut, before mentioned; that is, sutures passing from the upper posterior angle of the cut meatus to the periosteum above and behind the opening and from the posterior and inferior margin of the cut meatus to the periosteum below and behind the bony opening. These retention sutures are, however, in many cases, unnecessary.

Still another method of forming these flaps—and the method which I prefer in the very large majority of cases—is to incise the fibro-cartilaginous meatus in the direction of its long axis, along the line of the postero-inferior aspect. This incision is carried well out into the concha. From the point where it enters the concha, the incision is then curved upward, parallel to the antihelix and a short distance in front of this, to a point just below the anterior crus of the antihelix. In this way, a large flap is formed, consisting of the posterior and upper wall of the fibrous meatus, and a tongue-shaped conchal flap. The conchal integument is then raised and dissected up from the cartilage of the flap. The cartilage is grasped with forceps, dissected up from its posterior attachments, and excised. The meatal flap is then turned backward upon itself and stitched in position by fine interrupted catgut sutures. The tongue-shaped conchal flap—which after the removal of the cartilage, consists simply of integument—is now turned backward and upward through the large meatal opening which is formed by the cutting of this flap and is stitched in position to the raw surface posteriorly, by means of fine catgut sutures. In this manner, a large flap composed of integument and of the upper and posterior wall of the fibrous meatus, is formed which, upon replacing the auricle, so that the margins of the original posterior incision approximate, will be found to line the outer part of the upper wall of the cavity which has been formed in

the bone. So much for the formation of flaps. The particular method to be followed, must vary in each individual case. I have said nothing of the Koerner method of performing the operation, because I have had but little experience in this line, and the methods already given, have been followed by excellent results in my hands.

In almost every case, it is possible to hasten the process of repair by lining the bony cavity completely by means of Tiersch skin grafts. These I have taken from the internal aspect of the thigh, usually choosing the left thigh, as it is more convenient for the surgeon to cut grafts from the left thigh of the patient than from the right. At the time the patient is prepared for the operation, the anterior and internal surface of the left thigh is scrubbed, first with soap and water, shaved, again scrubbed with a 1-1,000 bichloride solution, and last of all washed off with equal parts of alcohol and ether. An antiseptic dressing is then carefully applied to the entire shaved area and confined in position first by means of adhesive straps, a layer of cotton and a firm bandage being subsequently applied over the entire area.

After the flaps have been formed in the manner above described, the surgeon next proceeds to cut grafts by the Tiersch method, from this sterile area upon the thigh. These grafts should be of large size, and are best cut with a large heavy razor. The one I use has a blade, at least eight inches long and one and a half inches wide. This instrument is sufficiently heavy to keep the skin flat in front of it, provided the skin is first drawn tense above by the hands of an assistant, while the surgeon places his left hand upon the lower portion of the thigh and stretches the skin by pulling forcibly downward. When I say that a large graft should be cut, I mean a graft, at least, an inch and a half wide by two or two and a half inches long. A little experience will enable the surgeon to cut the grafts of this size with extreme rapidity, and to cut them very thin. It is well to have the grafts as thin as possible, as a thin graft is much easier manipulated than a thick one. After the graft has been cut, it is removed from the razor to a large spatula by means of a sharp needle. A few drops of normal saline solution should be dropped upon the graft, and the spatula should also be moistened with saline solution before attempting to slip the graft from the blade on to the spatula. It is usually my practice to cut two or three grafts, some perhaps a little smaller than the dimensions given, so that if the surgeon fails to place the first one in position successfully, a second one will be ready at hand. The grafts being placed upon the spatulae, the surgeon then has the auricle drawn forward by means of an

assistant who places a sponge along the cut margin of the anterior flap so as to prevent any oozing into the bony cavity while the graft is being introduced. The posterior margin of the incision may also be protected in a similar manner, although this is much less apt to bleed. In cases where persistent oozing takes place from the margins of the incision, this may frequently be controlled by applications of a very hot saline solution, sponges being wrung out in this solution and applied to the raw surfaces. The margins of the incision being protected in the manner already described, the packing is next carefully withdrawn from the bony cavity. The spatula, carrying the large graft, is then taken in the left hand and carried completely across the bony cavity so that the free margin of the spatula rests close to the anterior wall of the meatus. By means of the sharp needle the edge of the graft is pushed off from the spatula and held against the anterior wall of the meatus. The spatula is then gradually drawn backward, and as the anterior end of the graft is firmly fixed, the graft slides off from the spatula and falls into the bony cavity. This manipulation must be performed somewhat rapidly, in order that the graft may sink deeply into the bony cavity as it leaves the spatula; otherwise, the deeper portions of the bony wound will fill with blood. If the manipulation is conducted quickly, the graft simply sinks into the middle ear, and can be applied closely to the internal wall of the tympanum, to the tympanic roof, can be made to cover the prominence of the aqueductus Fallopii, and of the horizontal semi-circular canal, and to also partially line the mastoid antrum. As soon as the graft has fallen into position, it is held in place by small pledgets of cotton which are impregnated with aristol. The first pledget introduced should be carried forward, downward and inward, so as to force a portion of the graft well into the mouth of the Eustachian tube. Another pledget should be quickly placed on top of this and the deeper portion of the cavity plugged as rapidly as possible, so as to hold the graft in position. During the process of packing the graft in position, it almost always happens that the edges of this thin layer of integument will roll more or less. After the deeper pledgets have been introduced, the graft may be spread out more perfectly by means of the long sharp needle, so as to line the more superficial parts of the cavity. The entire space occupied by the graft should be completely filled with these little pledgets, in order to press the graft firmly against the bony walls in every direction. It sometimes happens that in packing the graft into position, it may so fold upon itself as to make it impossible to spread it out completely over the walls of the cavity. When this takes place, a

second graft should be applied to complete the lining of the cavity. Experience has taught me that it makes no great difference if two grafts overlap, or if the second graft partially overlaps the cotton packing. So long as the graft is brought into contact with the walls of the bony cavity, the overlapping part, or the part not applied to the bony walls, sloughs, while the remainder of the graft becomes attached. It will be seen therefore, that the entire bony cavity may be lined throughout its entire extent, in this manner. After the surface has been grafted as thoroughly as possible, a strip of sterile gauze is placed on top of the cotton pledgets, used to hold the grafts in position, and its end brought out through the enlarged meatus. The posterior incision is then completely closed by interrupted sutures of silkworm gut and of silk. I usually introduce about four or five sutures of silkworm gut and then fine silk sutures between these, so as to obtain perfect apposition.

After the posterior wound has been sutured, it is sometimes wise to apply a graft through the meatus to cover the cut conchal margin. I have done this in a number of cases, and have in this way, avoided the development of granulations along the edge of the conchal incision.

The first dressing is changed on the eighth day, unless there is some odor from the wound, or the patient complains of severe pain; also if there is any leakage through the dressing or any marked elevation of body temperature. At the first dressing, the entire cutaneous wound will usually be found to be united throughout. In only a very small proportion of the cases that I have operated upon, have I failed to obtain primary union throughout the entire extent of the incision. In a few cases, where there was an acute inflammation present at the time of the radical operation, I have had extensive breaking down of the posterior wound. This has seldom given rise to any trouble, however, and in only three instances, has a permanent fistula remained. At this first dressing the strip of gauze is removed from the canal, and usually one or two of the cotton pledgets. Quite frequently, there is a very foul odor upon the removal of the first dressing, caused by the sloughing of the unattached portions of the grafts. This should not disturb the operator, as it does not, in the slightest degree, indicate that the operation has not been perfectly successful, and that the grafts have not adhered, to a great extent, at least. Where the odor is foul, it is well to remove as many pledgets as possible at the time of the first dressing. Whether or not these are removed, the canal is lightly dusted with aristol, a loose gauze packing introduced into the meatus and a light antiseptic

dressing applied over the ear and over the posterior wound. This dressing is then changed every second day, and at each subsequent dressing a few of the cotton pledgets are removed until all have been taken out, and the entire cavity remains free to view.

Out of 28 cases, in which the radical operation has been performed, and in which the skin-grafting method has been employed, in sixteen cases the grafts were applied at the time of the first operation, and in twelve cases, owing either to hemorrhage at the time of operation, or to the extensive involvement of the osseous structures, primary grafting was impossible; in these twelve, secondary grafting was done. Out of these 28 cases, 26 have been cured, and two, both of them cases of primary grafting, are still under treatment.

CORRESPONDENCE.

JUNE 11th, 1903.

EDITOR THE LARYNGOSCOPE:

Dear Sir:—I have read Dr. E. L. Shurly's "Remarks on the Etiology of Hypertrophic Rhinitis," in the May number of THE LARYNGOSCOPE *twice*, because of a fear that I may have overlooked what I consider a most important omission.

It seems incredible that an article of this nature should omit to enumerate dust inhalation as the most important causative factor (excepting the exanthematous diseases) in hypertrophies of the nasal mucous membrane and lymphoid ring. Dust is the universal carrier of pus germs and pus germs are the cause of hypertrophies in the respiratory tract.

Respectfully,

E. J. KUH.

LONDON, MARCH 20th, 1903.

EDITOR THE LARYNGOSCOPE:—Seeing to-day the article by Dr. Chambers on removal of the epiglottis in the February number of THE LARYNGOSCOPE, it has occurred to me that the enclosed cutting from the *British Medical Journal** may be of interest. I am,

Yours truly,

E. FURNISS POTTER.

* See next page.

**REMOVAL OF EPIGLOTTIS AS A PALLIATIVE MEASURE,
IN A CASE OF INOPERABLE MALIGNANT
DISEASE OF LARYNX.**

A case of extensive malignant disease of the larynx recently came under my notice in which the chief trouble complained of was the distressing dysphagia due to considerable involvement of the epiglottis; and it occurred to me that removal of the organ might be a useful palliative measure by relieving the distress and difficulty of swallowing, and so enable the patient to take ordinary food with comfort. This idea was suggested to my mind by Lake's* successful experiences of epiglottis removal in relieving similar symptoms in cases of laryngeal phthisis. The case was one of rapid growth in a man, aged 48. On repeated questioning I could not elicit a history of more than four months' duration from the onset of symptoms of trouble in the throat. The growth was extensive, involving the epiglottis, left side of the larynx, and the tissues external to it, there being practically a continuous infiltration between the thyroid cartilage and a large hard gland at the posterior border of the sternomastoid. Respiration was not interfered with. The difficulty and pain on attempts at swallowing solids were such that the patient refrained from taking solid food altogether, and for two months previous to my seeing him had had nothing but liquid diet. He stated that he had lost weight to the extent of 3 st. An ordinary oesophageal bougie passed easily. On May 13th, having painted the parts with cocaine solution, I removed the greater part of the epiglottis with a galvano-cautery snare; a portion, about one-fifth of the whole, was left, owing to inability to include the whole structure in the loop. This I contemplated removing at a second sitting, but, finding that relief was afforded to such an extent as to enable the patient to swallow solid food with comfort, I abstained from further interference. The operation of alternately tightening and heating the wire was almost painless, though the patient suffered some pain, owing to the barrel holding the wire, not being insulated, becoming heated, and slightly burning the base of the tongue. There was no hæmorrhage. The patient complained of his throat feeling sore for a day or two, but on May 18th was able to eat an ordinary meal (roast beef and vegetables, etc.) without difficulty.

In my opinion, the procedure was fully justified by the relief obtained, and I consider it a measure worthy of being resorted to in other similar cases.

E. FURNISS POTTER, M.D., M.R.C.P.

London, W.

Physician, London Throat Hospital.

* *British Medical Journal*, September 28, 1901, p. 890.

SOCIETY PROCEEDINGS.

ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

(Formerly the Western Ophthalmological and Oto-Laryngological Association.)

Eighth Annual Session, Indianapolis, Ind., April 9, 10, 11, 1903.

DR. W. L. BALLENGER (Chicago), President.

DR. D. T. VAIL (Cincinnati), Secretary.

Middle Ear Affections in Tuberculosis.—By ROBERT LEVY, M.D.,
Denver, Colo.

This paper was published in The Laryngoscope, May, 1903, page 357.

DISCUSSION.

DR. J. A. STUCKY (Lexington, Ky.).—I am very glad to have heard the paper and to learn that there is very little difference between the tubercular otitis media and the ordinary suppurative trouble we meet with. I have had eleven cases wherein I suspected the discharge was kept up by the tubercle bacilli; I had bacteriologists make examinations but found none present, however. Recently I had a mastoid trouble as a result of otitis media. I operated the third time. Nine examinations had been made of the pus but we found no bacilli until a week ago, and at the last operation we found tubercular disease of the bone. I agree, from my own experience, that very seldom do we find fully developed tuberculosis of the middle ear. I wish to ask about the use of the douche; I regard the post-nasal douche as dangerous in the hands of the patient, and I question the wisdom of allowing the average patient the privilege of using it. I doubt if any patient can do this effectually, and I wish to ask Dr. Levy what method he refers to when he says "use the douche frequently." He also advises the use of any of the solutions that will destroy the bacilli, and I would like to know what solution he would suggest that would destroy the bacilli and have anything left.

DR. JOHN J. KYLE (Indianapolis).—I agree with what has been said in regard to the great difficulty in finding the tubercle bacilli in the middle ear. With our somewhat limited clinical material, I know it is with us very difficult. Children suffer more frequently with secondary tuberculosis of the ear, rather than with primary. The great danger is in mixed infection. We find persons suffering

with military tuberculosis of the lungs predisposed to a tuberculosis of the middle ear. There is, at least, a tendency to a catarrhal condition of the ear. This is followed by an active, acute purulent condition and a rupture of the drum which may be continued from year to year. You will find it difficult to demonstrate the tubercle bacilli in the middle ear. It is hard to isolate, though we look for it with great care. I do not believe it is always necessary to isolate the tubercle bacilli in order to make a diagnosis of tuberculosis. We can easily understand why the tubercle bacilli can get into the ear from the nose and throat. It is often found in persons of normal health, in the nose and throat, especially in those who are associated with tuberculous patients. These may migrate into the middle ear. If we had primary tuberculosis of the ear, we would have secondary tuberculosis in the lungs, because there is direct drainage through the Eustachian tube into the lungs. I believe that primary tuberculosis of the ear is a very rare disease indeed.

DR. E. L. SHURLY (Detroit Mich.).—I cannot add anything to what has been said. The reader of the paper has stated the facts in a very concise and intelligent manner. It is wholesome for some of the older members of the profession to listen to these facts, for a few years ago it was a crime for any man to consider that the tubercle bacilli were not alone responsible for all so-called tuberculous affections. The statements made by the author are, in my belief, true—as true as anything can be that comes within human observation. I am especially impressed on account of some observations which I made on animals a few years ago. We had some monkeys treated by spraying into the nose solutions of sputum from advanced cases of tuberculosis. As long as this was kept up every day we could obtain and isolate tubercle bacilli. When the treatment was stopped for two weeks or so and the monkey isolated, the discharge from the nose would soon show no tubercle bacilli. Although we would put him among tuberculous monkeys again, we had to inject him again before we could find the bacilli. These monkeys were killed and an examination made of all the parts of the nose, but no tuberculous process could be found in the bony tissues or in the glands of the membranes. We examined the cheek pouches, the organs which correspond to our tonsils, and which are a most favorable place for culture media, and yet found no tuberculous process. The presence of the tubercle bacilli is probably largely a secondary event. The majority of these diseases are really of a mixed character.

DR. EDWIN PYNCHON (Chicago).—In Dr. Levy's paper he spoke of douches, and I understood he meant post-nasal douches, while Dr. Stucky evidently had reference to douches for the external auditory canal. I want to say one word regarding the benefit of douches: I have frequently used them in the external auditory canal in the treatment of inflammatory conditions, and only with the best results. I do not understand that Dr. Stucky wishes to denounce douches, but only the method of using them.

DR. JOS. BECK (Chicago).—I wish to make a few remarks in regard to some bacteriological experiments I have been making in the past year in the use of formalin in the ear, which I intend to bring out in my paper to-morrow. In answer to Dr. Stucky's question to-day. Heated formalin in various strengths was allowed to come in contact with culture media of tubercle-inoculated tubes, for various lengths of time, and cultures made from the same gave positive proof that the formalin from 10 to 15 per cent, heated, acted as a strong tubercle germicide. Forty per cent solution of heated formalin was allowed to pass into a middle ear infected with tuberculosis, and cultures made from the pus were innocuous. However, the ear became greatly irritated.

DR. JOHN A. L. BRADFIELD (La Crosse, Wis.).—I feel that what was said in regard to douches was due to the gentlemen not understanding each other. It is one thing for the patient to use the douche, and another thing altogether for the physician to do so.

DR. STUCKY.—The point I wish to make is that while I am not opposed to the post-nasal douche in the hands of the physician, I am opposed to it in the hands of the patient, and I think we all have seen serious effects from its use, the solution being forced into the middle ear and there doing great damage. As to the use of the external auditory douche, I am not afraid of that, but I have never got a solution far enough into the middle ear to destroy the bacilli.

DR. LEVY (closing discussion).—I recognize the fact that some of my statements are at variance with our former teachings and with some of the good authorities of to-day, but I have placed on record the result of my own personal clinical experience, and I am ready to be convinced. The difficulties in the way of finding tubercle bacilli in the secretions of the middle ear are many. They frequently are there but are not obtained in the cultures we make. At other times the bacilli are there simply transiently, and during their sojourn in the ear, coming in contact with other micro-organisms, their appearance is so changed that they are not recognized. In the report by Wingrave in the *Journal of Laryngology, Rhinology and*

Otology for March, he has shown that we have uncertain methods in examining these bacilli, and that there are so many different forms of tubercle bacilli that there is good reason to believe that oftentimes they are not detected.

The douche I referred to is the nasal douche. I understand from this an application of the douche from the anterior nares. If I had meant post-nasal douche, I would have so stated it. I believe this is the most dangerous manner in which to use the douche, unless very careful instructions are given.

As to syringing the ear, I spoke of a through and through method. Where the perforation is small it can hardly be done, but in this form of otitis, where we are dealing with a large perforation, the membrane being sometimes destroyed, I used the expression, "through and through" intentionally.

As to the use of formalin and other destroying agents, I presume the statement should be modified somewhat. I know that experiments are being constantly made in this line, and so far as I am aware at present the two agents which have the greatest power of destroying tubercle bacilli are carbolic acid and solutions of formalin. I am using these because they are tubercle destroying agents, but I did not say they are very destructive in the strength in which I use them. I dare not, of course, use the 40 per cent solution of formalin.

A Discussion on the Differential Diagnosis and the Treatment of Osteo-Sclerosis of the Mastoid Process.—By O. J. STEIN, M.D., Chicago.

DISCUSSION.

DR. JOS. BECK (Chicago).—This subject of Dr. Stein's has interested me very much, because I have followed it since he has presented it at the Chicago Medical Society, where it created such an unfavorable impression. I am going to operate on a case of that kind, and I would ask your indulgence in giving a brief history of the case. Bishop operated this case for mastoid disease on the same principle that Stein has mentioned. Three years ago he opened the mastoid in a woman 45 years of age; slight suppuration at one time in both ears. The suppuration ceased, but the pain did not, either on the side he operated or the other. The pain has been excruciating but it is not continuous. It lasts sometimes as long as a month. Strong narcotics have to be employed, and the patient is a physical wreck as a consequence. I believe that not until these mastoid cases are operated on and bone examined microscopically can we speak confidently of osteo-sclerosis, but it will be interesting to me

to watch this case and see if the pain will stop after the operation. I will hope to be able to present something in addition to this from the pathological side.

DR. BARNHILL.—I have seen several cases of osteo-sclerosis of the mastoid process, and have operated on a few with good results. I should hesitate to operate, however, on cases with no other symptoms than pain over the mastoid, and an old scar in the membrani tympani. My cases have all had chronic discharge from the ear, and I have looked upon the length of time the ear has discharged as being of great diagnostic importance as to the amount of eburnation in the process. I recently saw a case in which I believe a mistaken diagnosis had been made, and a part of the mastoid process chiseled away in the belief that there was sclerosis. In this case the membrani tympani was perfectly normal, and so was the hearing. There was chondritis of the external auditory meatus, and infiltration of the cervical glands; also numerous decayed teeth and pyorrhoea alveolaris, which oral conditions had much to do with the pain of which the patient complained. I should like particularly to have Dr. Stein state whether or not in his opinion osteo-sclerosis takes place to any considerable extent long after the suppurative process which caused it has ceased to be active, and after the perforated membrani tympani has healed.

DR. W. L. DAYTON (Lincoln, Neb.).—If I understood Dr. Stein correctly, he mentioned that in operating it was not always necessary to open up the antrum. In some of these sclerosed mastoids, we find that the antrum is but a small excavation, but the necessity of opening up to the antrum where pain was a symptom was illustrated in a case operated by Dr. Davie of the Illinois Eye and Ear Infirmary about a year ago. As I remember the history, there was absolutely a normal drum head. He opened the antrum and found it full of a purulent secretion, or rather, a muco-catarrhal secretion. Another case was that of a young man who had been stealing a ride on a freight train and was thrown from the train by a brakeman ten years ago, striking his head in the fall. Since that time he had had a chronic purulent otitis media. He came to me in almost a state of collapse. There were at that time no symptoms—such as slow pulse, high temperature—of abscess of the brain, but from the mental state I feared it. I determined to operate on the mastoid and then trephine over the temporal lobe. I opened up the sinus, in which I found granular tissue and removed it from the dura; I then opened nearly over the tip of the mastoid to the mastoid squamous suture and found only a slight depression where the

antrum should be. The anesthetist positively refused to give the chloroform further (we had made a mistake in giving chloroform) and I was obliged to stop the operation and put the patient to bed, thinking that the next morning I would open the skull. But the next morning he was too far gone and he died that afternoon. At the post mortem it was shown that he had an abscess in the temporal lobe, and no cells in the mastoid process larger than pin heads.

DR. W. R. MURRAY (Minneapolis, Minn.).—This paper has been very interesting to me. My experience with these cases has been limited, but six or seven years ago, at the Eye and Ear Infirmary in Chicago, a case was kept under observation for a considerable time before a definite diagnosis was made. The patient was a woman, somewhat neurotic; her tympanum was normal. She complained of a constant pain over the mastoid, neuralgic in character. The operation was finally done and the mastoid was found to be sclerotic, of intense hardness like ivory. The case was lost sight of after the wound had healed, but up to that time there had been no recurrence of the mastoid pain.

DR. STEIN (closing discussion).—I wish to disabuse your minds of the idea that one can diagnose this condition from any one or from any few symptoms in all cases. It is very difficult to make a positive statement as to the condition of osteo-sclerosis; it is to be made by exclusion. There is nothing tangible in literature upon the symptomatology of this disease that I can find. I have read some excellent articles upon the subject, but nothing from which we can positively diagnose this condition. I do not pretend to present an array of symptoms from which you are going to be able to diagnose this condition with a certainty at all times, but simply have given you what I have read and also what I have seen and learned from cases operated upon myself. You may take whatever of worth it may contain. The symptom of pain is the main thing and the one for which the patient applies for aid. It is usually the only symptom.

Dr. Barnhill in his question has emphasized the very point I wished to make. He said he would not diagnose such a condition from a simple scar of the drum membrane associated with the pain. I would not either. But in this uncomplicated variety you may find evidence of a former ear trouble in the scar or perforated drum membrane. This brings us down to the causation of the disease; is it primary or secondary? I could not answer the question now. Very likely it is a secondary process. Some claim it is an idiopathic disease. That is not the question I am bringing up.

In regard to opening the antrum, that has to depend upon the case. Probably in the majority of cases I would open the antrum, but if I had a case without a history or symptoms of mastoid trouble excepting this pain, I rather doubt if I would enter the antrum. In one case I remember distinctly of going as far as I dared and finding no antrum. There was no sign of a cell, and I took off the whole process. I do not know if I have made myself clear, but I hope I have.

Remarks on the Etiology of Hypertrophic Rhinitis.—By E. L. SHURLY, M.D., Detroit, Mich.

This paper was published in The Laryngoscope, May, 1903, page 337.

DISCUSSION.

DR. G. V. WOOLLEN (Indianapolis).—Dr. Shurly has shown very clearly that he has been with his subject a good while, and that he has delved in to the primary conditions, as we are not apt to do in our earlier experiences. The doctor has been at this long enough to know that it is not to be explained in a word. The philosophy underlying his remarks is profound and instructive because he goes back to pre-natal conditions. Some of you will remember that I read a paper before the American Laryngologic Society at Chicago on "Taking Cold." This subject is so nearly related to taking cold, or to the conditions we indicate by the phrase "taking cold" that it makes them one and the same, because you cannot have the hypertrophic condition without having the so-called cold or catarrhal condition. When you deal with this condition as Woakes does in his work on nasal catarrh, you go into the subject with which the doctor deals. He abuses alcohol greatly because he can see the ill effects of it which he confines to the Caucasian race. I have been racking my brain in reference to my own experience with the other races to discover whether or not he is justified in what he says, and I believe he is more than half way right. Our Ethiopian friends do not trouble us much in this way. I had not thought of the facial contour and brain as he suggests. When we come to the later manifestations, such as those we find in children, we are on familiar ground and have a better chance to study. Since my earliest teachings, I have insisted that this was a disease of childhood. I believe that none of you have met with a case of hypertrophic disease of the nose but that had developed during child life. I believe it to be, as I stated before, pre-eminently a disease of childhood. The first evidence will be on the anterior tip of the turbinal and a little red

spot will show its location. I have been accustomed to teach that this disease has an early inception (without going back to the pre-natal condition as the doctor has to-day)—that it begins first because of the physiological and second because of the anatomical construction of the nose. I have used as my first illustration to my students, the gills of the fish. As in these we have a physiological hyperæsthesia as compared with other parts of the body, and we have also a physiological hyperæmia of the nose as compared with other portions of the body. We must have these in order that the nose may perform the functions for which it was designed. Again, the nose is pre-eminently the seat of traumatism. In our childhood, our first efforts to roll over land us on our noses, and see the effect of these early traumatisms in the deflected septum, etc. As to our rooms, I have long felt that more harm was done by the overheating of rooms than by the underheating of them. We do not "take cold" as much as we "take heat," and then there is the dust. In places where this prevails intra-nasal hyperthophy is rife, and it is probably as frequent in Indiana as anywhere. The vicissitudes of the temperature, etc., are also important factors.

I enjoyed the doctor's remarks immensely and it is one of the greatest subjects that could possibly be brought before the Academy.

DR. H. STOWE GARLICK (Cincinnati, Ohio).—I was struck with the idea—new to me—that as a process of evolution we should have this hypertrophic rhinitis. One of the points not clear, I think, is that it is not a disease of childhood except as a result of certain outside causes which the doctor mentioned, and if that is so, how can he attribute the process to evolution? In the comparison of the Caucasian race to the Malays, for instance; the latter people are not exposed, as the civilized are, to the extreme changes of temperature, the massing together in colonies, and the dietetic influences to which we are all subjected, and it seems to me that before we can accept this theory it will require more careful investigation. The pre-natal influences of heredity can play their part in the facial resemblance of the child to its parent. The shape of the bones constructing the air passages, especially the nasal, will in after life have the tendency to produce hypertrophic rhinitis.

DR. L. C. CLINE (Indianapolis).—I am glad to hear Dr. Shurly, because I believe him a past master in the work, and what he says is always listened to with great interest because we know he is always telling what he believes.

Dr. Shurly has certainly given us an unique paper, one that contains much original thought and I am sure we all profit by having heard it, coming from one who is so rich in experience.

DR. HAL FOSTER (Kansas City, Mo.).—I have been very much pleased with Dr. Shurly's report and feel well repaid for coming here just by hearing his paper. I agree with him in his remarks about children. I think the specific exanthematous diseases leave a great many troubles along this line. Influenza is a prominent cause of this trouble, in fact, a very common cause. Where the winds and dust blow through western Missouri and eastern Kansas we have the atmospheric conditions favorable for hypertrophic rhinitis. I have noticed that where those of the colored race are subjected to the same conditions they have this trouble just as often as the whites. I think most of the men working in our line, where colored people live in large numbers, will bear me out. As regards troubles of the throat and nose they seem to be just as susceptible as other races under the same hygienic influences.

DR. ALBERT E. BULSON, JR. (Fort Wayne, Ind.).—I have been very much interested in this paper for the reason, as already stated by a previous speaker, that Dr. Shurly is a master in this line and always presents something worth considering. In my judgment hypertrophic rhinitis is largely a result of civilization, or, in other words, the condition under which we live. It has been my experience that the cause in a large majority of cases coming to me for attention could be traced to the vitiating influences to which the patient is subjected. One of the frequent causes of the disease is over-heated houses. Our American homes are over-heated and ill ventilated to a greater extent than those of any other nationality. No one can live in a temperature of 80 degrees, as usually found in our American homes, and not suffer to a more or less extent from catarrhal inflammation of the upper respiratory tract. Not only does the increased temperature have a baneful effect upon the mucous membrane, but it reduces the resisting power to cold, and the individual is thus more subject to acute inflammation as a result of exposure. Local conditions are frequently a caustic factor in the production of the disease, and here in Indiana we find natural gas, so much used as a fuel, an irritant which aggravates, if not causes, the disease. Diet also has much to do in aggravating the condition, those who partake of alcoholic beverages and rich foods being more susceptible to the disease than others who live plainly. In my experience individuals who live practically an outdoor life, and who belong to the poorer classes, are less subject to the disease than those who live under better conditions with warm houses and have a better quality of food. While inherited tendencies may frequently have some bearing upon the causation of the disease, yet I am inclined to

think that the disease is more frequently acquired as a result of the conditions under which we live.

DR. WM. L. BALLENGER (Chicago).—I wish to ask Dr. Shurly to bring out a few points: I noticed that in his classification of the etiologic factors, he did not mention the mechanical, that is, anterior nasal obstruction. This leads to the condition known as hypertrophy. That is a factor that is surely recognized. I also wish the doctor would state what is meant by "fake foods."

DR. SHURLY (closing).—I see that I made a great mistake in shortening the paper too much; for I have not made it clear to you that I meant to have a division between predisposing and existing causes. I did not mean to say that this race factor was the only cause of hypertrophic rhinitis, but merely predisposes to this condition. I agree with the former speaker that there are very few cases of actual rhinitis and few of inflammatory hypertrophic rhinitis. It is a term used for many years for hypertrophy of the mucous membrane or bone. It is a histological process and produced by an irritation, either external or internal, and a continuous histologic process which takes place. We suffer chiefly because we have deformed nasal passages as compared with other races and animals. While the Caucasian child has a better chance for a useful life, on account of a better cerebrum, he has a less immunity on account of the inferior quality of his special senses. He has not the same quality of the sense of smell or hearing that the Malay or Indian has. The Negroes we come in contact with here, having been for a long time under the same environment, are not really typical; for it you will look at them you will see that there is a great difference in the anatomical formation of their upper respiratory passages also. The Negroes in Detroit, coming to our clinics, are very poor and have not the same capabilities or opportunities as the white man, yet I have seen few cases of hypertrophy in them, as compared with the whites. However, they have comparatively plenty of space and a better chance for the development of the mucous membranes in their nasal passages, and for breathing.

It is measles, diphtheria and such diseases which our children acquire, and which our aboriginal ancestors did not have, that cause much of the chronic conditions. We are increasing in these causal factors, and while we are superior to them from a mental standpoint, yet physiologically speaking, we are inferior to them. We have nothing like the power in our special senses that they had. The theory suggested is that simply on account of this change from the original type, we have certainly had impressed upon us through an

evolutionary process, and combined with the exciting causes that beset us, more liability to hypertrophic rhinitis. We find that the man who lives out of doors all the time scarcely ever has hypertrophic rhinitis. I did not mention the stoppage of the anterior nares because I did not want to take up the pathology of hypertrophic rhinitis.

The Principles of Rhinologic Practice.—By EDW. PYNCHON, M.D., Chicago.

This paper will be published in the August issue of The Laryngoscope.

DISCUSSION.

DR. BARNHILL (Indianapolis, Ind.).—Most of the principles laid down by the doctor I would be quite willing to accept. I rise to ask a question as to what method Dr. Pynchon has used in determining the distance of the middle turbinate from the septum. I do not believe that I have personally seen a case in which I could determine this accurately in the living subject, and it has seemed to me that there must at times be a normal condition in which the septum lies in slight contact with the middle turbinate. In the New York Laryngologic section of the Academy of Medicine, I remember there was once a discussion as to this, and at that time some of the best men of this society believed that there might often be slight normal contact between these two parts.

DR. PYNCHON (closing discussion).—In reply to Dr. Barnhill, I would say that of course it is very difficult to decide accurately about this matter of the middle turbinal, but I have frequently noticed in patients who come to me that there is a lack of proper space, and when I have secured this by surgical means so I can pass a small cotton pledget through with ease from front to rear, it allays the symptoms complained of to a marked degree.

While I have talked about the perfect set of teeth and the emmetropic eye, I suppose they are not often found. It is the same with the nose. I cannot call to mind that I ever ran across a pair of perfect nostrils, but I have occasionally found one perfect nostril wherein I could tell by sight or by the use of the cotton applicator that there was no contact at any place. In hay fever there is a great weakness for this middle turbinal being too close to the septum.

(To be continued in July issue.)

THE LARYNGOLOGICAL SOCIETY OF LONDON.

Eighty-First Ordinary Meeting, April 3rd, 1903.

J. DUNDAS GRANT, M.D., F.R.C.S., Vice-President, in the Chair.

The Morbid Growths Committee reported on specimens examined, as follows:

MR. LAKE's specimen (No. 1) of new growth from interior turbinal (*vide* 'Proceedings,' January, 1903, p. 52) was considered to be "a large round-celled sarcoma with a tendency to an alveolar arrangement." No. 2, of growth involving inferior turbinal and septum (*vide* 'Proceedings,' January, 1903, p. 52), "sarcoma with Myxomatous degeneration on the surface."

MR. HUNTER TOD's specimen (*vide* 'Proceedings,' February, 1903, p. 72) of bleeding polypus of the septum was considered to be an angioma.

DR. LAMBERT LACK's case (*vide* 'Proceedings,' March, 1903, p. 93), section removed from epiglottis, "no evidence of tubercle was found in the specimen, the structure of which corresponds with what is known as lymphadenoma."

The following cases and specimens were shown:

Case of Laryngeal Disease.

Shown by DR. KELSON. The patient, a man *æt.* 55, a messenger by occupation, had suffered from loss of voice of six week's duration. There was no history of syphilis, no wasting, nor could tubercle bacilli be found in his sputa, which were scanty but yellow. Examination showed much swelling of the epiglottis, arytaeno-epiglottic folds, arytaenoids, and the right ventricular band; the vocal cords were difficult to see, but appeared to be slightly swollen. The cervical glands were not enlarged, and the lungs appeared to be normal. The man had been attending hospital for two weeks, during which time his voice had certainly improved. Opinions were asked for as to diagnosis.

SIR FELIX SEMON said this was another very obscure case, and he spoke with great hesitation, but the most likely explanation seemed to be a very acute tubercular infiltration. The disease was so universal in its attack upon the parts which he was able to see, *viz.*, epiglottis, right epiglottidean fold, arytaenoid cartilages, but not the interior of the larynx, that one might practically, for diagnostic purposes, in-

clude anything of a similar character. It was too dense to be an ordinary œdema of any kind.

DR. LACK was under the impression that one could actually see minute opaque caseating tubercles under the mucous membrane of the anterior surface of the epiglottis.

Case of Swelling of Right Side of Larynx (for Diagnosis).

Shown by DR. H. J. DAVIS. The patient, a man æt. 29, first came to the Middlesex Hospital fourteen days ago. Six years ago the voice had become husky, and hoarseness had persisted ever since. He had no other symptoms.

The larynx was partially occluded by a red, tense, unilateral globular swelling. The left cord only was visible, and appeared normal.

The swelling was firm to the probe, though softer in parts. It was unreduced by the application of a 20 per cent. solution of cocaine, and when incised with a rectangular palate needle hemorrhage was profuse. The swelling diminished somewhat in size, but now, after ten days, it was as large as ever. The points of puncture were represented by the two yellow lines seen on the upper surface of the swelling. They had healed rapidly.

There was no external thickening of the larynx and no specific history.

At the apex of the right upper lobe posteriorly there were indefinite signs of early consolidation of the lung, and, in consequence of this, the exhibitor was inclined to look upon the case as tubercular, though he did not think that the appearance of the larynx warranted such a conclusion.

The patient was a little pale, but his appetite was good; he had no cough or expectoration, and seemed quite unaware of his laryngeal occlusion.

MR PAGET desired to have the opinion of members, first as to diagnosis, and secondly, in the event of the disease being considered to be malignant (sarcomatous), as to whether thyrotomy should be performed at once.

The patient was spraying the larynx with 20 per cent. lactic acid, was taking cod-liver oil, a teaspoonful night and morning, and ten grains of potassium iodide three times a day.

MR. BUTLIN came to the conclusion that Dr. Davis was probably right in thinking this tuberculous. The swelling was very red on the surface, and had not the appearance of a new growth, even malignant, in that situation. He noticed several tiny yellow spots. If it were tuberculous he confessed he had never seen any case of laryngeal tuberculosis quite like it. As to removing it, he thought if it

caused trouble it ought to be exposed by a thyrotomy, and then one could ascertain its extent and nature, and be guided by this in the question of removal.

SIR FELIX SEMON would not venture to give any definite opinion as to the nature of this tumefaction. It might be anything. Sarcoma was not impossible; tuberculosis extremely unlikely. It might be a case of chronic perichondritis, or a case of exochondroma. Therapeutically he agreed with Mr. Butlin, that the proper thing would be, if it caused serious inconvenience, to do an exploratory thyrotomy, and be guided in one's further proceedings by what was found at this preliminary operation.

MR. E. B. WAGGETT had seen a case rather similar to this at a meeting of the Society which proved to be an adenoma, the glandular tissue being that of the thyroid gland. The peculiarly rounded contour on the inner aspect of the present swelling was rather unlike that of an infiltration, and suggestive of a tumor or of a cyst.

SIR FELIX SEMON, in criticising the remarks of Mr. Waggett, said the swelling followed too much the original outlines of the parts to be a thyroid tumor. He believed really it was an infiltration of the parts, since they were enormously enlarged and still showed their original outline.

DR. DAVIS said the case was first regarded as one of tuberculosis owing to slight physical signs at the apex of the right upper lobe posteriorly, but they were very indefinite. The note on percussion was slightly impaired and expiration prolonged. Mr. Gould had removed some tuberculous glands from the neck of the patient's sister. The patient was in excellent health, and except for the hoarseness he did not know there was anything the matter with his throat. He first saw him a fortnight ago, when the swelling was so tense as to have the appearance of a cyst. He felt it with a probe, and tried to puncture it with a laryngeal lancet, but the lancet would not go in. With some little difficulty he inserted a rectangular palate needle, and, to his intense surprise, the blood spurted out as if an aneurysm had been opened. The swelling diminished, and the patient said he could breathe better. The hemorrhage soon ceased. Later, he came back as bad as ever; there were two little yellow spots to be seen—the seat of the punctures.

MR. PAGET was inclined to think it a sarcoma, and that the larynx should be opened at once.

DR. GRANT thought Dr. Davis would now feel justified in the hesitation he felt in coming to a conclusion with regard to the diagnosis. It would be to the advantage of the Society if he would bring the man before them again at a later date. At present there did not seem any immediate call for active interference.

Case of Singer's Nodule (Left Vocal Cord).

Shown by DR. FURNISS POTTER. The patient, a healthy-looking man æt. 41, who sang in a village choir and taught in a Sunday school, had suffered from slight huskiness for the last twelve months, which had come on after an attack of influenza. Impairment of voice was the only symptom complained of. On examination a small nodule was seen on the edge of the left cord in the anterior third. The cord in the immediate neighborhood of the excision was very slightly reddened, but there was no swelling of the cord itself.

Case of Chronic Empyema of Both Frontal Sinuses and Maxillary Antra; Radical Operations to Illustrate the Almost Complete Obliteration of the Maxillary Sinuses Following the Radical Operation.

Shown by DR. HERBERT TILLEY. Miss H—, æt. 41, had suffered from a purulent nasal discharge for about ten years. It followed immediately upon an attack of typhoid fever. During the past five years headache has often been sufficiently severe to preclude her from following her duties as a professional nurse. Inability to concentrate her mind upon her work has also been a more or less constant symptom. During the last-mentioned period polypi have on several occasions been removed from her nasal cavities.

When first seen last November patient would allow no external operation to be performed, but was very anxious to have any relief which might be obtained from internal treatment of the nasal cavities, *e. g.*, curettage of ethmoidal region, removal of middle turbinals, etc. This was strongly advised against, but owing to the constant and urgent requests of the patient it was eventually undertaken. The removal by curettage of the anterior group of ethmoidal cells upon the right side was immediately followed by hemorrhage into the eye socket, causing protrusion of the eyeball. This followed the most careful handling of the parts, which were in a very advanced state of degeneration. During the following five days it was evident that suppuration had taken place within the orbit, and upon the sixth day (under "gas" anæsthesia) two drachms of pus were evacuated by an external incision in the large "cleavage line" of the lower eyelid. The patient rapidly recovered, and eventually desired to have the external operations performed as she had originally been advised.

Both frontal sinuses were operated upon by the radical method (a modified Kuhnt's operation) on January 12th. A free communica-

tion was made with the nose in each case, but it was allowed to close by granulation tissue as rapidly as possible, so that in the course of ten days or so the sinus cavities were shut off from the nose, and granulated up without further trouble.

January 28th.—The radical operation was performed on both maxillary antra. A large opening was made in the canine fossa, the thickened, degenerated lining membrane scraped away, the cavity disinfected with zinc chloride solution, grs. xl ad ʒj, and a light packing of cyanide gauze inserted for forty-eight hours. The gauze was removed at the end of this period and not reinserted, the antral cavities being only syringed out with warm boracic lotion twice daily, carefully dried, and then left alone. No opening was made into the nose.

Examination of the antra now will show that they are practically filled with granulation tissue, it being only just possible to pass a probe upwards through the fistulous track through the original opening in the canine fossa.

DR. HERBERT TILLEY maintained that in these cases, where the radical operation is thoroughly carried out, cure is brought about by the growth of granulation tissue from the internal walls of the cavities uniting with the large mass of granulations which sprout into the cavity from the soft parts of the cheek in the situation of the canine fossa. Eventually the original cavity of the antrum is so reduced in size as to form merely a slight extension of the outer wall of the nasal cavity.

Unfortunately the patient exhibited was suffering from an acute nasal catarrh, which rather detracted from the healthy appearance of the nasal mucosa, which now, under ordinary circumstances, was absolutely free from a suspicion of pus. Both sphenoidal sinuses can be seen opened in the upper and posterior region of the nasal cavities.

DR. HALL asked what was the effect of transillumination in these cases.

DR. FITZGERALD POWELL thought Dr. Tilley was to be congratulated on the thoroughness of this operation so far as the frontal and sphenoidal cavities were concerned. As regards the maxillary sinus, he did not quite see the object of obliterating this cavity, even if it was possible—a fact which he very much doubted. As the cavity was deep and elongated, extending in an antero-posterior direction, he doubted much whether even if a large portion of the anterior and lateral wall of the sinus were removed, one would get the soft tissues falling in sufficiently to unite with the granulation tissue to destroy

the sinus altogether. On the other hand, he did not see the necessity of practicing this obliteration method and destroying the antrum. There were much less formidable and simpler operations, such as thorough drainage and washing of the cavity through a large opening at its most dependent part, viz., through a tooth socket. He believed that in 99 out of 100 cases if this were thoroughly done, and a large enough opening made and large tubes were used, a perfect cure could be obtained without destroying the cavity.

MR. WAGGETT would not enter into a discussion upon the best method of attacking these cases, but he wished to state that the sinus in all the cases operated on radically did not become filled up. He had certainly met with several cases where, after removal of the whole outer wall of the inferior meatus of the nose, a very large cavity remained after complete healing had taken place. His own experience led him to think that obliteration in these and in frontal sinus cases depended on the amount of irritation which took place after operation; in other words, on the length of time during which post-operative packing was employed. If the outer wound were immediately sewn up and a large opening made into the nose, and no packing employed, he believed that the antral cavity did not by any means become obliterated, but, on the contrary, was very little decreased in size as a rule. That certainly was the case with the frontal sinus where, after the Ogston-Luc operation and with immediate closure of the external wound, the cavity remained absolutely or very nearly the size that it was before operation as far as could be tested by the use of a long probe. If, however, a frontal sinus were left open, and packing in diminishing quantity employed for a prolonged period, the cavity became filled up with a tough leathery growth of thickened periostium.

DR. LACK agreed with Dr. Powell and Mr. Waggett in their remarks. It was absolutely impossible for a normal antrum to fill up with granulation tissue. To obliterate the antrum would require excision of the upper jaw. If the inner wall of the antrum between it and the inferior meatus were entirely removed, as in the usual radical operation, these cases would get quite well; there was therefore no need to obliterate the cavity.

DR. SCANES SPICER agreed with Dr. Powell, Mr. Waggett, and Dr. Lack. He failed to see the necessity for obliteration, even if possible. The radical operation with which the names of Swindon and himself were associated was so very successful in curing these cases that he could not see why one should wish to depart from a method which had become classic. Luc's modification (*i. e.*, sewing

up the bucco-antral wound at once) was preferable to leaving it open, as saving pain, irritation, and reinfection. In the present case he thought it was too soon to say yet that the cavity was obliterated, or even that the case was radically cured.

DR. GRANT said that he was sure Dr. Tilley did not advocate this method of treatment, except for a comparatively small number of cases of empyema of antrum in which milder measures had failed. With regard to the obliteration of the antrum, there was no doubt it was a more radical method; nor did he see why it should be impossible, more especially if a very forcible invagination of the nasal wall of the antrum was carried out at the time of the operation. He thought Siebenmann had described how it should be done, viz., by putting a finger in the nostril right into the antrum, and forcing the inner wall of the antrum outwards, thus bringing it into very close contact with the soft tissues which grew inwards from the hole in the canine fossa.

DR. TILLEY, in reply to Dr. Hall, said that the result of transillumination after operation for radical cure was that the antrum was always dark. Whilst speaking on this point, he thought it somewhat curious that if one transilluminated the antrum a week after the radical operation, and after having curetted away the thickened mucous membrane, the darkness was just as great as it was before any operation had taken place at all. He had satisfied himself of this fact many times, and he thought the darkness of the antrum in an empyematous condition was due to the chronic inflammation in the bony wall, and had nothing to do with the pus and mucous membrane in the cavity.

With regard to Dr. Powell's question, and the doubt as to the possibility of obliteration, he did not wish to be understood as saying that directly one met with a case of chronic empyema of the antrum one advised a radical operation, for this was the last thing he would think of advocating. One should always give the patient a description of the two courses of treatment and let him take his choice. Naturally, to start with, every one chose the milder form of treatment. Then, if not cured, the patient began to get tired of the everlasting drainage and washing out; he found it a nuisance and a trouble, and wanted to know if something else could not be done. Then, he thought, one had a right to advise the radical operation, and hold out a very good prospect of complete cure by it.

With regard to the remarks of Mr. Waggett on incomplete obliteration, and of Drs. Lack and Scanes Spicer, he had evidently been misunderstood. He did not say the whole of the cavity could

be obliterated. Having removed a large part of the anterior wall and the inner wall of the antrum at the radical operation, one found as the result that granulation had sprung up over the remaining portion of the antral wall; the epithelium spread in from the nose, and the soft parts fell in through the anterior opening. All these formed a certain amount of tissue in the original cavity of the antrum, which attained such a size that the antrum was practically obliterated. On looking into the nose six or seven weeks later and attempting to pass a probe, one found it impossible to insert it further than half an inch, therefore the cavity must be diminished to a very great extent, but not totally. The cases which were cured were those in which the greatest diminution of the size of the original cavity took place.

As regards the packing, to which Mr. Waggett had referred, in this case he took out the packing forty-eight hours after operation, and put in nothing else afterwards. He syringed out the antrum morning and evening, and dried it afterwards each time. The advantage of a large opening in the anterior wall was that one could take a large speculum and look inside, and apply a suitable antiseptic if one saw any unhealthy point.

A Case of Clonic Spasm of the Muscles of the Palate and Pharynx Causing Entotic Tinnitus in a Lady æt. 30.

Shown by DR. PEGLER. This and the following case were brought to display certain features in contrast to, and yet others in uniformity with, Mr. F. J. Steward's case shown at the last meeting. The latter case called forth an opinion that it depended upon a severe organic nervous lesion, probably cerebellar, whereas the present ones were almost certainly functional, and in fact fell into the second of the two classes into which Dr. Lack had arranged the cases of clonic palatal spasm described up to the time of his paper ('Laryngoscope,' vol. iv, No. 6).

E. H.—, æt. 30, complained of a clicking sound mainly in the right ear, but occasionally in the left, rarely in both simultaneously. Duration three months. The clicking was audible with or without the aid of the diagnostic tube in the right ear, and was associated in the patient's mind with the right lateral pharyngeal band (salpingopharyngeus). On examining the throat it was observable that the sound was concurrent with clonic spasm of the posterior pillars of the fauces. The rhythm of the contractions was interrupted at intervals—the rate per minute, now slower than formerly, 42. The movements in the throat were of two kinds; one, a high vertical upward contraction of the velum and uvula, presumably due to spasms of

the levatores palati; and the other an approximation of the posterior pillars, due to contraction of the palato-pharyngei, the tubal slip of which apparently caused the sound complained of by suddenly separating the walls of the Eustachian tubes. Distinct movement at the mouth of the tube was visible through the nasal meatus, and the two kinds of movement were not always concurrent. There was a simultaneous adduction of the arytenoids and vocal cords, ceasing on phonation. No distinct causal relationship could as yet be affirmed, but there had been simple erectile tumefaction of both inferior turbinals, which had been treated by the galvano-cautery, and with much general benefit, whilst the clicking sounds were now considerably diminished in rate per minute. The patient had evidence of functional nerve deafness and other interesting auditory symptoms, which had been detailed elsewhere. She was slightly neurotic, but had no other marked hysterical symptoms.

Clonic Spasm of the Soft Palate Causing Objective Noises in the Pharynx in a Woman aet. 20.

Shown by DR. PEGLER. As a matter of fact this patient also had entotic tinnitus, but in her left and deafer ear. Duration two months. The palatal movements were simple upward jerkings of the uvula as in the last case, due to symmetrical contraction of the levatores palati, but they had latterly increased enormously in rapidity; the first notes taken stated them to be 10 or 15 to the minute, but they had since risen to 240 per minute with scarcely any intermission.

Again, as in the last case, the adductors of the vocal cords contracted simultaneously, but every few seconds the cords remained widely abducted for a second or so. The clicking was very loud when the mouth was open, but when the tsicky character of the secretion was changed, as by the use of the cocaine spray, the sound ceased entirely for a time. The naso-pharynx and pharynx were clogged with mucus excreted by the very considerable pad of pharyngeal tonsil, which might here be held to be the local exciting cause. After its removal, if there were any manifest improvement, the case would be reported upon to the Society again. The hysterical symptoms were not very marked. No hemianæsthesia, but pain, "pins and needles," and numbness were complained of on left side of face and head. Mother stated the noises were not heard during sleep. Palatal anæsthesia considerable, and when held forward firmly by the palate hook the laryngeal movements went on as usual. Dr. Pegler advised comparison with Sir F. Semon's (viii, 49) as well as with Dr. Lack's (v, 38) and Dr. Bond's cases (iii, 41), as equally interesting studies in the hysteriology of the pharynx.

Case of Pharyngeal and Laryngeal Lesions in a Woman aet. 28,

Shown by DR. DONELAN. The patient, a married woman with three healthy children, had a severe attack of diphtheria seven years ago. She says her throat was severely ulcerated at that time, but that she recovered her voice. Her youngest child, a fine boy, was born four months ago. Dr. Donelan saw her only once, a week ago, when he found the uvula, velum, palate, and both anterior pillars eroded. There was a large ulcer on the epiglottis, and the laryngeal mucous membrane was much swollen and ulcerated in patches. There was complete aphonia and some dyspnoea. He put her on mercury and iodide with a view to clearing up the diagnosis.

DR. HALL asked how long an interval intervened between the attack of diphtheria and the appearance of the lesions.

DR. DONELAN, in reply to Dr. Hall, said the patient had diphtheria seven years ago. He saw her for the first time a week ago, and immediately put her on antisyphilitic treatment. She was voiceless when first seen, but was already greatly improved.

DR. HALL approved of the antisyphilitic treatment adopted. The case presented the characteristic appearance of tertiary ulceration of the pharynx and palate. There was considerable destruction of tissue. He thought a continuation of the antisyphilitic treatment would make a great improvement in the condition. He doubted whether diphtheria had anything to do with the present affection, considering that it was seven years ago since she had diphtheria.

SIR FELIX SEMON wished to make a general remark with reference to what Dr. Hall had said. He really thought that they, as throat specialists, ought to receive with the greatest scepticism all histories of ulceration and cicatrization—to however trifling extent—in the throat, of such diseases as diphtheria and scarlet fever. He was by no means inclined to attack the possibility of sloughing occurring in exceptionally bad cases, but in the enormous majority of cases syphilis was the cause of the throat condition. They should be extremely careful in taking for granted, on the strength of the patient's statement, a history of such diseases.

DR. DONELAN said the history of diphtheria was given by the patient. He tried to get her husband to come and see him, but he would not. At first sight it presented the appearance of lupus.

Case of a Woman aet. 37, with Ulceration of the Soft Palate Behind the Left Tonsil.

Shown by MR. LAWRENCE. The palate was acutely inflamed and very painful two months ago. Iodide of potassium was given in, first, ten-grain, then fifteen-grain doses, three times a day. In less than a fortnight the case was well. The condition now remaining was one of extensive loss of substance between tonsil and uvula, having only one thick strand of tissue uniting palate and pharynx. No history could be obtained except the very doubtful one of exposure to "bad drains" six months ago.

DR. DONELAN thought it was syphilitic.

MR. LAWRENCE said that although the ulcer was in a most unusual position he had little doubt that it was specific. The aspect of the disease in its acuter stage was suggestive, and the action of iodide of potassium in so quickly relieving the symptoms only added to the probable correctness of the diagnosis. Although the patient could not or would not give any history, he had been informed that her respectability was not above suspicion—another fact to be considered in making the diagnosis.

Specimen of Section of Acute Tuberculosis of Left Tonsil from a Man aet. 32.

Shown by MR. WESTMACOTT. The disease commenced in August, 1902. There was no family history or evidence of tubercle elsewhere. Ulceration had spread to the soft palate since removal. There had been great pain in the tonsil and neck on the left side from the onset.

Drs. WINGRAVE and LACK agreed that the specimen exhibited did not show evidence of tuberculosis in any form.

DR. WESTMACOTT, in reply, said the only point of clinical importance was the absence of enlarged glands in the neck. The other tonsil was perfectly healthy. There was a great deal of pain, and a sort of excavation on the front of the left tonsil. He did not take any steps to try and find bacilli in the sputum or discharge, as he had seen the patient only a day or two before he removed the tonsil. Since this operation the ulceration had spread to the soft palate, but with the application of lactic acid and formalin this had ceased and healed in about three weeks; the patient was now perfectly well. Before he saw him the patient had been treated by iodide of potassium and mercury, but with no result.

On the suggestion of MR. ATWOOD THORNE it was decided that the specimen be submitted to the Morbid Growths Committee.

Microscopic Section of Localized Psorospermiosis of the Mucous Membrane of the Septum Nasi.

Shown by CAPT. O'KINEALY. The patient, a married male Mahomedan, *æt.* 22, came under observation at the Medical College Hospital, Calcutta, on the 12th of May, 1894, on account of a growth in his left nostril. He was a native of Bihar, and had been working as a mason for the past two and a half years, previous to which he had been employed in a hide store for eighteen months. His appearance was healthy, and his past history, including that of his family, was good.

About three years previously, while working in the hide store, he first noticed the growth, which bled frequently, the hemorrhage being worse in the hot than in the cold weather. He went to a hospital, where it was removed with forceps, and he suffered no further inconvenience for six months. After this, however, the growth began to reappear, so he had recourse to a native barber, who removed it a second time. He was again relieved for a few months, but the tumor once more recurred, accompanied by attacks of *épistaxis*, and he was compelled to seek further relief. He was not aware of any of those employed with him being similarly affected.

On examination a small vascular pedunculated tumor, about the size and shape of a large pea, was seen projecting into the vestibule of the left nasal fossa. It was a freely movable painless growth with all the appearances of a papilloma, and was attached by a short pedicle to the mucous membrane at the anterior and upper part of the cartilaginous septum, being entirely confined to that region. The remainder of the upper respiratory tract was healthy, and no evidence was found of any disease elsewhere.

The growth was easily and apparently completely removed by forceps and the cold snare, though it was composed of friable tissue which bled rather freely. The patient remained under observation for nearly three weeks after the operation, when he ceased attending the hospital, and all trace of him was unfortunately lost. By this time, however, there were definite signs of recurrence, and on the 6th of June, 1894, the date on which he was last seen, a small highly vascular pimple with a red apex was seen at the site of removal.

The tumor was examined by Major J. C. Vaughan, I.M.S., then officiating Professor of Pathology at the Medical College, to whom the exhibitor was much indebted for permission to put the case on record, as well as for the specimen and the following report:

Pathological Report by Major J. C. Vaughan, I.M.S.

"The growth was removed from the septum narium by Captain O'Kinealy, and to the naked eye had the appearance suggestive of a small papillomatous excrescence on the mucous membrane; but the tissue was friable, and there was rather free bleeding in removing it. The tissue removed was a piece about as large as a "marrowfat" pea. It was hardened for three or four days in absolute alcohol, and then embedded in paraffin and cut. The sections, placed first in turpentine, were washed afterwards, first in xylol, then in chloroform, and then in spirit. They were then transferred to water, and stained in picocarmine, and mounted in Farrant's solution.

"On microscopical examination the tissue removed seems to consist of the following elements, disposed as described below:

"The free surface of the tissue under examination is somewhat irregular in its outline, and presents certain crypt-like involutions of its surface, which is covered with a layer of squamous epithelium of irregular thickness in different parts, and which extends down into and lines the free surfaces of the involutions above referred to; and is also in some sections seen as isolated nodules embedded in the general tissue. This surface epithelium is in parts clearly degenerated, the cells having mostly run together into a colloid-looking mass, in which no nuclei can be stained. In other, and more especially in the deeper layer, the cell outlines can be clearly distinguished, and nuclei stain fairly well.

"The mass of the groundwork of what is above referred to as the 'general tissue' appears to consist of a coarse, irregular granulation tissue, almost entirely of the nature of more or less organized granulation tissue, and, judging from its anatomical relationship to the epithelium, is apparently the submucous or subepithelial tissue, which has been the seat of a chronic slow inflammatory process, due probably to the irritation set up by the presence of, and by the continuous growth of, numerous cyst-like bodies which are seen scattered throughout both the epithelial and subepithelial tissue. These cyst-like bodies form at once the most remarkable and, indeed, the central feature to be described, and they occur in practically all stages of their development.

"The fully developed cyst, examined under a Reichert's 1-15 oil immersion lens with a Zeiss No. 1 ocular, shows the following structure:—It is seen to consist of a symmetrically rounded cavity, bounded by a clear hyaline wall or membrane, and filled with small cells or spore-like bodies. The tissue in which the cyst occurs is condensed around the wall of the cyst. Where it occurs in the

epithelial parts of the tissues, the more or less polygonal epithelium is flattened out into cells, spindle-shaped on section. Where the cyst is found in the subepithelial tissue, the fibres and cells of this tissue form a dense zone immediately applied to the cyst wall. In these dense zones, both in the epithelial and subepithelial areas, nuclei are not readily made out. In the epithelial layer the cells in this zone seem undergoing a colloid-like degeneration; in the subepithelial area they seem to have become organized into a firm fibrous capsule, which varies somewhat in thickness in different cases, as well as in the density of its structure.

"The yaline cyst wall is of pretty equal thickness throughout any given cyst. It is a clear membrane, highly refractile, and under oblique illumination shows a striation of its substance, the striae running nearly parallel to each other and being concentrically arranged. There is no trace of cell structure observed in the membrane (or wall), and it does not appear to have any cell lining, either on the inside or on the outside, and both along its outer and inside edges it shows a clear single-contour line. In almost every case it resists stain with either carmine or picric acid or fuchsin, and is apparently quite unaffected by acetic or osmic acid $\frac{1}{2}$ per cent., or by Liq. Potassæ up to a strength of 30 per cent., even after some days in the case of this last. The average observed thickness of the cyst wall varies from .02 mm. to .01 mm. Where fully developed cysts in section are seen to have been ruptured, the cyst wall has either collapsed or is spread out in the neighboring tissue as a distinct and clearly defined band-like structure, and seems, from the position occupied under such circumstances, to be possessed of some degree of elasticity. Cysts measure across from .144 mm. to 2.24 mm.

"The cyst contents, seen in the case of cysts which have been ruptured.—These seem to be more or less symmetrically rounded or ovoid bodies, of an average diameter of .005 mm. Each cell or sporule consists of a granular central material surrounded by a delicate bounding membrane, which under appropriate illumination gives a double fine contour line. These bodies are likewise refractile, their membranes darken slightly with $\frac{1}{2}$ per cent. osmic acid, and they seem to clear up slightly with acetic acid and with 30 per cent. Liq. Potassæ. The bounding membrane seems to be distinctly elastic, and where these bodies are observed inside an unruptured cyst they seem crowded together, and apparently faceted to accommodate each other where they come in contact with each other or with the cyst wall. Whether there is any intervening

substance or not it is difficult to say; but the cells in any case tend to stick to each other after they are shed from their cysts, and even to preserve their faceted appearance where they remain in contact with each other. As seen *in situ* in the cysts they stain slightly purple with picro-carmin, and also faintly but more marked with acid fuchsin. When shed from a cyst they infiltrate the tissue into which they are shed, retaining their characters as above detailed. This infiltration appears to be purely a mechanical one, and there is no evidence of the sporules undergoing, in the tissues into which they are shed, any change suggestive of multiplication, or of development towards the form of the complete cyst described above."

Remarks.—This was, the exhibitor considered, a case of true local psorospersmosis, and he had been unable to find any record of the disease occurring in the nasal mucous membrane, though coccidia had of course been found in man in other situations. The condition, as was well known, existed in some of the lower animals, and he was therefore inclined to attribute its origin, in this instance, to direct infection from the raw hides among which the patient was working at the time he first noticed the growth.

CAPTAIN O'KINEALY, I.M.S., in reply to Mr. Spencer, said he had not the rest of the material. He had only one or two sections, which were stained and mounted at the same time. He was indebted to Major Evan for the specimen. He at first thought it was an ordinary papilloma, and was greatly surprised when he saw the condition they had seen in the specimen. He had reason to believe, though he did not think they had been published, that similar cases had been met with in Calcutta. He had not seen them. The late Major Evan, Professor of Pathology, who died from plague, had seen some of these cases, and they would have been published but for his untimely death. So far as he knew, this was the only case on record of the condition.

On the suggestion of MR. BUTLIN it was decided that the specimen be submitted to the Morbid Growths Committee, and a drawing be made for publication in the 'Proceedings.'

Case of Ulcerating Growth of Left Tonsil, Side of Tongue, and Anterior Faucial Pillar in a Man *æt.* 52.

Shown by DR. FITZGERALD POWELL. The patient came under observation on the 9th of March, 1903.

He complained of pain in his throat when swallowing, and of a pain extending up to his ears, which was worse at night. He could not open his mouth or protrude his tongue. The pain in the

ears had existed for twelve months, and in the throat for three or four months. He had been losing weight.

On examination his jaws were seen to be partially fixed, and he could only open his mouth slightly. The tongue could not be protruded. The left tonsil and the side of the tongue were seen to be the site of an ulcerating growth, which was covered with a greyish slough, and bled readily. This extended up on to the left anterior pillar of the fauces.

No specific history could be obtained, and there was no enlargement of glands in the neck.

The appearance of the disease was strongly suggestive of malignancy, but bearing in mind that not infrequently disease thought to be malignant in this situation cleared up under iodide of potassium and mercury, it was decided to give him twenty grains, with a drachm of the *Liq. Hydrarg. Bichlor.*, three times daily.

Under this treatment he had improved very much; the ulceration was less extensive, and the pain was less. He could open his mouth wider and was gaining weight.

The ulceration had not, however, entirely disappeared, and Dr. Powell expressed a desire for the opinions of members as to the diagnosis and future treatment.

MR. W. G. SPENCER thought it was malignant. It was in an awkward situation and difficult to remove, as it had spread back to the inner side of the ramus of the jaw. It would need the L-shaped incision of Langenbeck, with division of the jaw, to remove the growth. He was doubtful whether it should be removed.

Large Papilloma of the Right Ventricular Band in a Woman aet. 33, Removed by Thyrotomy.

Shown by MR. WAGGETT. The subject, drawings, macro and microscopical specimens were shown.

The growth, about the size of a small filbert, was attached by a long base to the edge of the ventricular band. Although a simple papilloma, it had appeared in life studded with points of snowy whiteness. Intra-laryngeal manipulations under cocaine were out of the question, owing to the nervous character of the patient, and as neither the nature nor the extent of the growth was certain, laryngofissure was performed.

The patient left the hospital on the eighth day, and the larynx was now (nine months after operation) normal in appearance and in function.

Aphonia had existed for eighteen months before the operation.

SIR FELIX SEMON said that, as he was originally responsible for the statement as to "white papilloma," he particularly wished to observe the second characteristic of these papillomata, which turned out to be malignant. Not only were they distinguished by their snow-white color, but their excrescences were not rounded, but pointed as ordinary papillomata.

DR. POWELL said it was an excellent result after thyrotomy. Was it not possible to remove the growth interlaryngeally?

MR. WAGGETT said the woman was an exceedingly difficult subject, so much so that a distinguished laryngologist thought she had tubercular ulceration. It was impossible to remove even a piece for examination by the intra-laryngeal route.

Chronic Empyema of Sphenoidal Sinus; Opened.

Shown by MR. WAGGETT. He had employed in this case an instrument resembling a Krause's sliding attic chisel, inverted and enlarged, which Dr. Lack had devised.

Case of Immobility of the Left Vocal Cord, Attributable to Bronchocele, in a Young Woman; Resection; Extirpation of Isthmus and Left Lobe.

Shown by DR. DUNDAS GRANT. Florence A—, æt. 25, house-keeper, was first seen November 6th, 1902, complaining of soreness o. throat with occasional loss of voice, which had developed during the previous three years. Although previously she had been fond of singing, she was now unable to do so, and occasionally she had complete aphonia; five years previously she had had hæmoptysis. The left vocal cord was absolutely fixed, and there was slight swelling in the region of the arytaenoid cartilage. The left eyeball was slightly prominent, and there was firm general enlargement of the thyroid gland, especially on the left side. For a considerable time she was treated by means of internal administration of iodides, but no change took place. On the 24th of March, Dr. Grant excised the isthmus and the left lobe of the thyroid, leaving, however, a portion of this lobe behind, so as to avoid the risk of damaging the recurrent laryngeal nerve. A few days after the operation the patient's voice was clearer. Healing took place without any rise of temperature or other disturbance. At present the voice is clearer than before, and there is movement of the left vocal cord for at least half its normal extent.

DR. DE HAVILLAND HALL said there seemed to be more thickening and enlargement of the left arytaenoid than was accounted for by pressure of the left recurrent. It was probably a joint case rather than a paralytic condition.

Case of Paresis of both Recurrent Laryngeals and Left Sympathetic in a Middle-aged Woman.

Shown by DR. DUNDAS GRANT. Mrs. A. H—, æt. 40, was first seen on March 26th, 1903, on account of discomfort in her throat, which she stated had come on suddenly three years before. The voice was thick and seemed weak; she had a tickling cough and on swallowing liquids there was frequent regurgitation through the nose. On examination there was found almost complete paralysis of the palate, and both vocal cords were nearly fixed halfway between adduction and abduction. The left pupil was contracted and fixed, not acting either to light or to accommodation. The left palpebral fissure was diminished and the eyeball somewhat prominent. The left eyebrow was drawn up in the endeavor to raise the left upper eyelid. The left half of the forehead was moister than the right. The movements of the tongue and lips were irregular. The knee-jerks were exaggerated, and the pulse abnormally rapid. There seemed to be a lesion in the medulla, and also one in the cilio-spinal region of the spinal cord, and in all probability specific in nature. It appeared that seven years ago she suffered from a severe sore throat, accompanied by falling out of the hair and a rash on the chest. Two children, however, born since then—one aged five, the other twelve—appeared to be in good health. She was ordered 10 grs. of iodide of potassium thrice daily, and when seen a week later expressed herself as feeling better and free from regurgitation through the nose when drinking, the other symptoms being, however, much the same as before.

DR. GRANT said that the laryngeal paralysis was certainly less than when he first saw the patient, when paresis of both vocal cords was well marked. The evidence of affection of the sympathetic was still unmistakable. The improvement under iodide of potassium seemed to confirm the diagnosis of syphilis.

Case of Disease of the Larynx of Twelve Month's Duration, Probably Epithelioma, in a Man æt. 50.

Shown by DR. DUNDAS GRANT. Mr. J. M—, æt. 50, was first seen on March 31st, 1903, on account of hoarseness and loss of voice, which had developed rather suddenly and had been steadily getting worse during the last twelve months. His appetite was good; there was no pain in swallowing, and no difficulty in breathing; he was not getting thinner.

Laryngoscopic examination revealed an irregularly papillated outgrowth occupying the whole of the area of the left vocal cord, with some infiltration of the corresponding portion of the vestibule, and diminished mobility of that half of the larynx. There was irregularity and swelling of the anterior portion of the right vocal cord, with some infiltration of the corresponding ventricular band; no enlarged glands, and no apparent spreading of the thyroid cartilage. His medical attendant reported that he had been treated freely with iodide of potassium and mercury without any benefit. There was no sign of tuberculosis in the chest and no history of hæmoptysis. All possibilities of specific infection were denied.

The condition appeared to be one of extensive intrinsic epithelioma of the larynx. The patient was apparently a man of equal disposition, and otherwise in good health. The exhibitor asked for suggestions with regard to treatment. In view of the amount of infiltration and superficial extent of the disease he was inclined to think that thyrotomy with removal of the soft parts in the interior of the larynx would be insufficient, and that nothing short of complete excision of the larynx would be of avail. Failing this he would only advise tracheotomy, and would be inclined to place the issues before the patient and leave the choice to him. As regards removing a fragment for microscopical examination, he would be disinclined to do this unless the patient elected for radical operation, in case of the diagnosis being confirmed.

SIR FELIX SEMON agreed with the diagnosis of epithelioma, and saw no reason why a portion of the larynx should not be removed from either side. He would throw out a suggestion to members which he had found very useful in cases in which it was necessary to cut clean across the vocal cord. When the anterior part of the cord was affected it was advisable not to leave the posterior part alone, because it projected afterwards like a tumor into the interior of the larynx, but to stitch it with one or two stitches forward to the ventricular band. This procedure gave very good results, and astonishingly good results with regard to the voice.

DR. LACK agreed with the diagnosis of malignant disease and recommended thyrotomy. It might be possible to remove the whole of the disease by an operation which stopped short of total extirpation, but this point would best be decided after the larynx had been laid open.

DR. GRANT asked what farther steps the members advised in the treatment.

SIR FELIX SEMON advised thyrotomy, and either removal of the soft parts or of half the larynx according to the depth of the infiltration.

DR. GRANT said the disease had extended to the opposite side.

SIR FELIX SEMON said that made no difference. The larynx should be split, and he would then be guided by what he found.

Case of Rapid Destruction of Nasal Septum, Probably Lupus, in a Male aet. 34.

Shown by DR. WYATT WINGRAVE. The patient, a well-nourished male, a plumber, complained of a sore nose of six months' duration. It commenced as a sore spot just inside the nostril, which soon became a hole, and, melting away like glue, eat its way on to the lip. He was in the habit of picking it freely and pulling out hairs. There was now complete loss of septum from before backwards, as far as the posterior limit of the vestibule, with nodular ulceration of the upper lip on the site of the philtrum, more or less covered with crusts. He gave no history of syphilis or tubercle. The gums were healthy, but he had some copper-colored spots on the forehead. He had been married twelve years and had four healthy children. His wife had had no miscarriages. There was a submental enlarged gland.

DR. GRANT said that the columella of the nose was eaten away entirely by a curious circumscribed ulcer. Had any member seen a similar case? It was very difficult to decide whether it was a case of primary syphilis or of tuberculosis or of epithelioma.

MR. ATWOOD THORNE thought it was a remarkable case, of which an illustration should be given in the 'Proceedings.' He was not aware that such a case had ever been shown previously to the Society.

MR. SPENCER said that such a condition was more often seen in inherited syphilis. One saw it coming on with great rapidity in children called scrofulous.

DR. DE HAVILLAND HALL remarked that scrofulous tumors were mostly due to inherited syphilis; as a student he was taught to regard the two as the same thing.

DR. WINGRAVE, in reply to Dr. Powell, said that at present he had adopted no treatment except the local application of boracic acid. The local conditions were strongly suggestive of lupus, and the process seemed almost quite now. When he first saw the case the area affected was simply a mass of crusts.

Case of Exophthalmic Goitre.

Shown by DR. BURT. Female æt. 18. First seen about a year ago.

History.—Under treatment of family doctor for four years for anæmia and palpitation, swelling of thyroid not noticed, and has grown gradually worse.

On examination patient was very anæmic. Temperature normal, pulse 150, irregular. Hands very shaky. Very restless. No exophthalmos. Left internal strabismus. Pupils normal. Enlargement of thyroid, especially right lobe. Tongue large, pale, and tremulous. The case was diagnosed and treated as one of early exophthalmic goitre, giving first Ammon. Cit., Pot. Iod., and Digitalis, introducing strychnine and arsenic. The latter drugs did not apparently suit patient. In four weeks patient was quite free from anæmia, and the pulse was regular and normal. Hands still unsteady. Thyroid much smaller. In about three months patient was able to resume her studies, and could do her drawing, painting, and music with ease, which she had not been able to do for over a year. Mixture stopped three months ago. For past month, although free from anæmia, quick and irregular pulse returned with hands very shaky, again rendering it difficult for her to continue her painting, etc. Right lobe of thyroid much larger, and extends higher up beneath the sterno-mastoid. Placed under same treatment as before, but patient disliked having to take medicine. Would be glad if members could suggest further treatment, or whether they thought operative treatment advisable.

DR. HALL said the young lady seemed to him to be in a great hurry to get well. She was going on satisfactorily, but these cases lasted for years. As to the question of operation, there was no reason for it. The pulse was only 92, and that with the excitement of examination and strange surroundings. He advised arsenic, strychnine, and digitalis, and rest—mental and physical. He thought the iodide should be discontinued, for patients with exophthalmic goitre did not seem to tolerate the drug well.

DR. BURT said he had kept the patient perfectly quiet, had forbidden tea, coffee, etc., all games, and everything tending to excite her.

SELECTED ABSTRACTS.

The Facial Nerve in Relation to the Radical Mastoid Operation

—RUSSELL NOLAN, (Sydney, Australia)—The *Australasian Medical Gazette*. August, 1902.

This is a paper on an anatomical subject which is of great importance to the ear specialist and is valuable because based on dissections of the temporal bone which show the great motor nerve of the face from various aspects and especially its relation to the cavity in the bone which would be made in this operation.

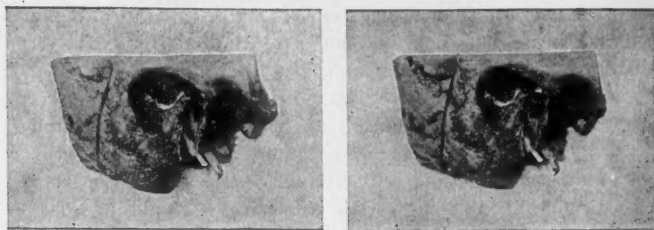


Figure A.

External surface of portion of the right temporal bone, showing, from right to left, the glenoid fossa, bounded above by the zygomatic process (posterior root), the styloid process being well marked below.

The vertical plate of bone, which divides the glenoid cavity from the cavity just behind, is the anterior wall of the meatus.

The floor of the meatus is marked by a deep cutting made to expose the nerve from the floor of the tympanum to the stylo-mastoid foramen.

Above is seen the inner wall of the tympanum with the first part of the nerve just passing over the foramen ovale.

The large cavity, most posterior, shows on its inner wall the opened antrum (marked out in white paint), continuous, in front, with the tympanum.

Between these two cavities is seen the ridge of bone, the external semicircular canal.

The importance of the triangle of MacEwan as a guide to the position of the mastoid antrum may be gathered from a study of the stereoscopic plates which illustrate the paper and also the statement quoted from MacEwan's writings that out of 450 temporal bones examined this triangle was definitely shown in no less than 426 and of the remaining 24 it was recognizable in 22.

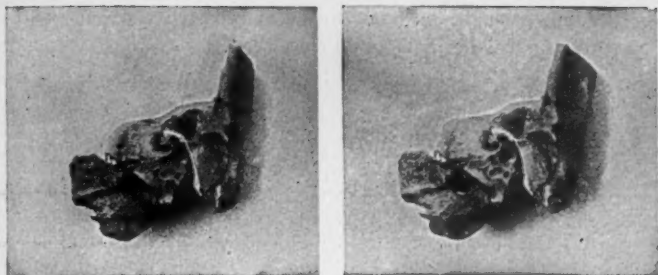


Figure B.

Vertical section through the long axis of the external auditory canal of the left temporal bone, showing, from right to left, the mastoid process; MacEwan's triangle; the posterior wall of the canal; the tympanic cavity, with opening into antrum above; the nerve exposed in its whole course, from the internal wall of the tympanum to the stylo-mastoid foramen, and the first and second turns of the cochlea (in section).

Attention is directed to the probable value of the ridge of bone which marks the position of the external semi-circular canal as a guide to the position of the nerve.

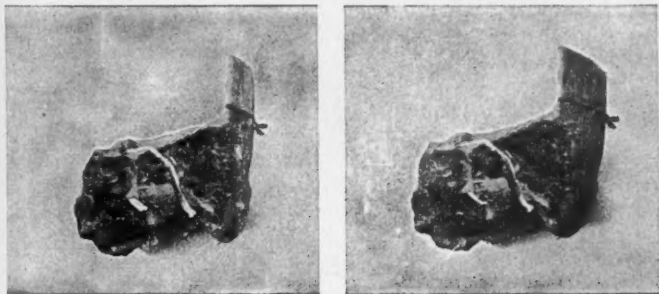


Figure C.

A section in a similar direction to Fig. B, but made further forward, which shows the floor of the meatus, and shows also the promontory unci (the first turn of the cochlea).

The excavation is such as might be made in this operation. The nerve is exposed in its canal. The ridge of the external semicircular canal is seen above, and external to it, between the operation cavity behind and the tympanum in front.

The chorda tympani nerve is seen, cut short as a short white rod; emerging from the bone at the posterior part of the tympanum.

This ridge of dense bone which is found on the floor of the passage leading from the tympanic to the antral cavity is well seen in the specimens having the bone in close relation.

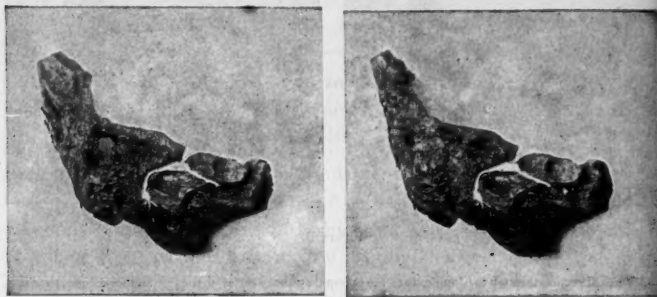


Figure D.

A vertical cut through the mastoid process and long axis of the right petrous temporal. From left to right—the mastoid process, with an excavation which opens on its inner wall into the sigmoid sinus.

The antral cavity, an olivary shaped depression, continuous forward over a ridge of dense bone (the external semicircular canal) and the facial nerve, with the tympanum. The nerve exposed in its whole course.

The inner tympanic wall with the promontory pointing backwards, having the foramen ovale above and the foramen rotundum below.

A depression on the upper border for the Gasserian ganglion and the carotid canal in its whole length.

The interest of the paper lies in the illustrations which are stereoscopic and demonstrate in a remarkably realistic way the different relative positions of the nerve and the surrounding structures.

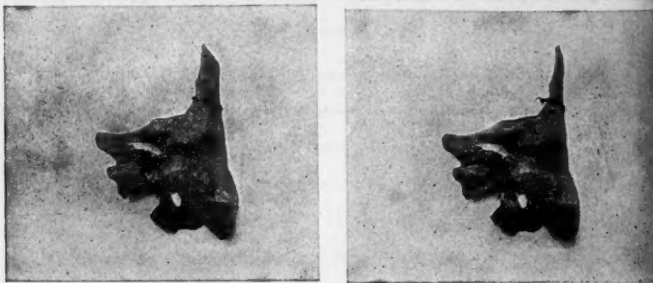


Figure E.

Vertical section of the left temporal bone, the cut passing through the long axis of the external meatus, across the tympanic cavity, and through the long axis of the internal auditory meatus.

MacEwan's triangle is only faintly seen. The attic is well seen, extending outwards over the roof of the meatus.

The stylo-mastoid foramen is cut obliquely. The first and second parts of the facial are shown in the opened canal, and the chorda tympani is seen coming forwards into the tympanum.

(These illustrations may be detached and placed on the rack of an ordinary stereoscope, when the relationship of the various structures will be more clearly seen and appreciated. As the width of the printed page of THE LARYNGSCOPE is less than the focal width of the stereoscope, the duplicate illustrations may be cut and mounted on cardboard to fit.)

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